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ABSTRACT

This mathematics curriculum guide is one of a series developed by the Kendall Demonstration Elementary School (KDES), which serves hearing-impaired students in grades 1-8, to provide a clear representation of the school's programs in various subject areas. Essential classroom practices in the areas of planning, instruction, and evaluation are summarized. Curriculum objectives are arranged in a scope and sequence format and each objective is supported by student activities, instructions for teachers, recommended resources, and in some cases, evaluation strategies. The objectives are organized by school year as well as content area to make it easier for teachers to plan for students at all levels. Development, practice, and application activities provided for every objective are intended to help in daily lesson planning. The KDES math program is organized around six strands or goal areas which are incorporated into the program at every grade level: (1) sets, numbers, and numeration; (2) operations and properties; (3) measurement; (4) geometry; (5) relationships, statistics, and graphing; and (6) problem solving. Yearly progress charts are provided for each level. Appendices include a glossary of terms used in the guide, a materials resource list, and instructions and forms for recording student progress. (VW)

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Kendall Demonstration Elementary School

MATHEMATICS CURRICULUM GUIDE

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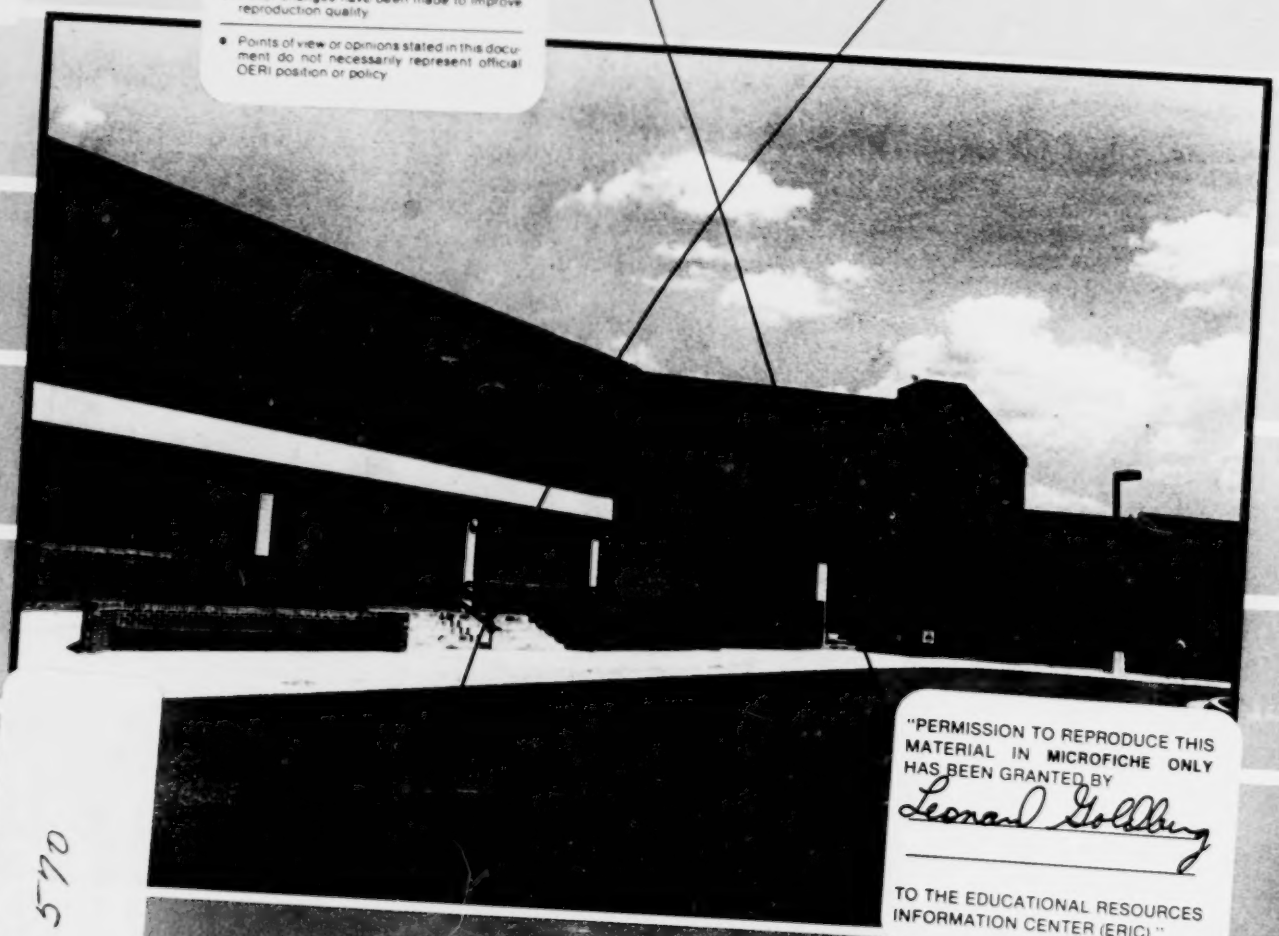

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Second Edition

Kendall Demonstration Elementary School

MATHEMATICS CURRICULUM GUIDE

Developed by Virgyl Mason
KDES Mathematics Content Specialist
Pre-College Programs
Gallaudet University

EC 202570

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Second Edition

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KENDALL DEMONSTRATION ELEMENTARY SCHOOL
MATHEMATICS CURRICULUM GUIDE

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KDES MATHEMATICS CURRICULUM GUIDE

PREFACE

During the 1980-81 school year, the Kendall Demonstration Elementary School (KDES) undertook the development of a curriculum guide series, a clear and accurate representation of the school's programs in Science, Language Arts, Mathematics, Social Studies, and Auditory Skills. Curriculum objectives, which had been several years in development, were arranged in a scope and sequence format. Each objective was supported by student activities, instructions for teachers, recommended resources, and in some cases, evaluation strategies.

As part of the initial development process, early drafts of the guides were used in KDES classrooms and evaluated by teachers. That evaluation provided data for revisions, and first editions of the guides were published and offered to other programs in 1982. Since that time, additional evaluation data have been collected from KDES teachers and students.

This second edition of the KDES Mathematics Curriculum Guide incorporates many recommendations that resulted from that ongoing evaluation. The guide now includes a detailed teaching philosophy. The objectives are newly organized by levels as well as content areas, and for each objective, the guide recommends a series of teaching/learning activities.

Looking to the Future

In addition to the curriculum guides, KDES is currently involved in a major effort to design criterion-referenced tests to evaluate student achievement of curriculum objectives in each of the four core areas. Those items are being pilot tested in KDES classrooms, and will be field tested in other programs serving deaf students. At some point in the future, the criterion-referenced test items will be available from Outreach as a supplement to the curriculum guide series.

During the course of this development effort, KDES has also been implementing a computer-managed education system (CMES), designed to deliver low-cost computer technology to schools and programs serving hearing impaired students. Both CMES

hardware and software systems are available from KDES at reasonable cost, and can be adapted for any educational environment. For further information about computer-aided instruction, additional Pre-College curriculum materials, or opportunities for in-service training, please contact:

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Gallaudet Pre-College Programs
Gallaudet University
Washington, DC 20002
202/651-5342

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Dean of Curriculum and Instruction
Gallaudet Pre-College Programs

KDES MATHEMATICS CURRICULUM GUIDE

FOREWORD

In their daily routine, teachers of mathematics deal with a number of important realities: their own experience and training, the needs and capabilities of their students, the curriculum requirements of the school and school district. Successful learning often focuses on situations involving mathematics that arise during the course of the school day. One thing is certain; students will live all their lives in a world pervaded by situations that require familiarity with the skills and principles of math.

A comprehensive elementary school math guide, then, must provide structure for teaching a variety of information on a broad spectrum of math concepts. It must emphasize the importance of perceptions and skills, building students' confidence in their own ability to analyze and solve the problems they encounter. It must be practical and flexible enough for use in a cross section of educational settings. The KDES faculty members who have contributed to the development of this guide have good reason to believe that it meets those important criteria.

A first edition of the KDES Mathematics Curriculum Guide was published in 1982. During the intervening years, teachers at the Kendall School and in other programs using the guide were encouraged to provide feedback on its practicality for classroom use. The author of this second edition, Virgyl Mason, is the math content specialist for KDES. While greatly condensing the content of the original, she managed to incorporate additional features requested by those evaluators.

- The learning objectives on which the guide is based are organized by school year as well as by content area, making it easier for teachers to plan for students at all levels.

- Development, practice, and application activities are provided for every objective, offering valuable help in daily lesson planning.

Before her appointment as math content specialist, Virgyl Mason spent 17 years as a classroom teacher at Kendall school. For much of the past two years, the bulk of Mason's time not required for routine duties has been devoted to the preparation of this mathematics curriculum guide. In articulating the rationale and philosophy of the guide, Mason incorporated material prepared by Kerry Corcoran; interim drafts of the curriculum were reviewed by teachers and supervisors at KDES.

The earlier edition of the mathematics guide was developed by Philip Mackall, with the assistance of Iris Dayoub and Rubye Frye, all of KDES, and Kent Mann of the Kentucky School for the Deaf. Mary Abrams, managing editor of Outreach Products, part of the Pre-College Center for Curriculum Development, Training, and Outreach, helped with final editing, formatting, and production.

Margaret Hallau, Ph.D., Director
Center for Curriculum Development, Training, and Outreach
Gallaudet Pre-College Programs

1

INTRODUCTION TO THE KDES

Mathematics pervades all areas of life. A c
provides a basis for the study of science, t
living; and for many leisure time activities
changing process, with math as an essential
interpreting change as it happens. This cu
students for participation in an evolving wo
evolving document.

Learning math is a hierarchical process (Gag
corresponding hierarchial teaching structure
essential road maps for learning (Resnick an
help students master the skills that will en
to more complex tasks.

ATHEMATICS CURRICULUM

clear understanding of mathematics
echnology, and nature; for earning a
s. Life is an ongoing and ever
tool for dealing with and
rriculum, designed to help prepare
orld, must therefore be a flexible,

gne, 1968). The establishment of a
e helps provide children with
nd Wang). This guide is set up to
nable them to move easily from simple

PHILOSOPHY OF THE KDES MATH CURRICULUM

Math should be approached as a cognitive process (Piaget, 1965). It is clear that children learn many concepts intuitively, well before they can grasp them in abstract terms. The actions of young children are dictated by what they perceive in their immediate environment.

Every school has an obligation to provide its students with a solid foundation in mathematics, encompassing content, skills, and application. To that end, any good curriculum must provide for the progressive mastery of skills and content as students work through the grades. Criterion referenced tests, adminstered at appropriate points in each strand, are helpful in evaluating student learning.

In today's world, however, it is not enough to equip students students with well-developed mathematical skills. Tomorrow's adults will also need the ability to discover, create, verify, and generalize information. Development of these abilities is an important product of any methods used to teach specific skills and content. The involvement of students in meaningful problem-solving activities is therefore a priority in the use of classroom time.

The ability to solve problems, to estimate and approximate, and to provide reasonable answers to questions are integral parts of the teaching and learning process, incorporated into every area of the program on a regular basis. To limit expectations of student progress to competence at math computation, without appropriate attention to other areas of learning, is to set standards far too low. (Dietz and William, 1981).

Because children's thinking processes are dependent on reality, it is important for teachers to use concrete objects or their representations to illustrate abstract concepts. Activities must be structured to help students find the link between physical qualities and their symbolic representation. Beyond the use of concrete materials, true learning requires explicit connections between an object and its symbol or procedure. The Essential Practices section of the guide gives specific suggestions for structuring the environment and the role of teachers in this teaching/learning process.

Finally, a major aim of mathematics teaching is to give students an appreciation for math as a living, interesting science, and a basic part of their equipment for life. It is essential for students to become familiar and comfortable with the concepts of mathematics, and to be able to apply those concepts to every aspect of their daily lives. When the teaching job is done adequately in elementary and middle school, students should enter high school with the skills they need to continue further study at levels commensurate with their abilities and aspirations.

Conceptual Scheme for Organizing Math Objectives

The KDES math program is organized around six strands or goal areas, listed below. The letters in parentheses indicate the abbreviations for goal areas used in the guide.

Sets, Numbers, and Numeration (SNN)

- Identification, descriptions, and classification of sets and subsets.
- Demonstration of the meanings of various types of numbers: cardinal, ordinal, whole, fractional.
- Reading and writing of numerals for those numbers, both figures and words.
- Use of expanded, exponential, and scientific notation.
- Counting; rounding.

Operations and Properties (OP)

- Computation: addition, subtraction, multiplication, division of whole and rational numbers.
- Application of properties of numbers: commutative and associative.
- Manipulation of equations.
- Estimation.

Measurement (MEAS)

- Using measuring tools.
- Measuring in terms of length, capacity, weight, time, money, and degrees.

Geometry (GEO)

- Identification of geometric figures and their properties.
- Construction of geometric shapes.
- Using instruments and formulas.

Relationships, Statistics, and Graphing (RSG)

- Comparisons of sets, shapes, numbers, etc.
- Computation, interpretation, and the use of statistical measures: mean, median, mode.
- Interpretation of graphed data.
- Graphing of collected data.

Problem-Solving (PS)

- Applying learned operations to verbal problems.

Students are expected to work on each strand every year. An appropriate interweaving of strands is the basis for student progress.

How to Use the Guide

The first step in understanding the purposes and nature of this guide is to read the Philosophy section (page 7) and the section on Essential Classroom Practices (page 11). The first section explains the theoretical basis of the program. The second describes classroom strategies and techniques that teachers may employ to promote learning in a manner consistent with those theories.

The Scope and Sequence of Objectives

The mathematics objectives are listed according to topic strands, and arranged in sequence, levels one through eight. Reading through this section will help teachers and administrators familiarize themselves with the range of instruction covered by this curriculum.

Levels of Instruction

The objectives in the Mathematics Guide are divided into eight instructional levels, each designed as one year of classroom work. Each level has several basic units of instruction. Depending on its scope and complexity, each unit may include objectives from several topic strands, or from just one strand.

How to Plan Instruction

First familiarize yourself with the mathematics level most appropriate for your students. This will give you an idea of the range of material to be covered and the specific objectives to be achieved in one year.

Look at the suggested sequence of instruction. Although no fixed hierarchy governs the many skills and concepts to be learned in elementary mathematics, the objectives are arranged in a sequence that seems most likely to encourage learning. The backgrounds and varied experiences of students should always be considered in instructional planning.

Read the Activities section at your students' instructional level to sample the kinds of activities that should be planned to accompany and reinforce key topics in mathematics. You will note that each level is divided into developmental activities, practice activities, and applications.

Recording Student Progress

Yearly Progress Charts (pages 95 through 127): These charts may also be used to record student achievement of objectives. The Cumulative Progress Charts (in Appendix D) trace the progress of individual students from level to level, based on information from the Yearly Progress Charts. Teachers are encouraged to make enough copies of these forms to keep accurate, day-to-day records for each student. Ideally, these records will become part of the student's permanent school file.

ESSENTIAL CLASSROOM PRACTICES

Among the components that define a curriculum are the essential practices associated with it. Those particular practices set one curriculum apart from others, and make it identifiable. They also define the skills and knowledge teachers will need to demonstrate in order to say that the curriculum is in place. Following is a summary of essential practices for classroom planning, instruction, and evaluation.

Planning

The relationships among objectives, instruction, and evaluation must be clear and cohesive: the objectives set up for individual students must be based on curriculum guide objectives. Those objectives are also the focus for instructional activities and for later evaluation. As much as possible, objectives should be organized into integrated units that emphasize reading, writing, and communication, as well as various thinking skills.

Activities, whether organized into instructional units or in other ways, should provide an experiential context for learning. Students who engage in activities that have meaning for them can acquire a cohesive view of the world. The activities teachers assign to help students achieve the objectives should include opportunities for experimentation and exploration, and should encourage students to generate hypotheses and make predictions.

Instruction

Teachers should establish an educational environment that encourages students to take risks. Each new attempt is an opportunity for students to test their hypotheses and predictions and to take further chances. Several ways to encourage risk-taking are described briefly below. More extensive discussion is provided throughout the curriculum.

- Allow sufficient "wait time" between the teacher's question and the student's response. Students need time to think, and the teacher can communicate the idea that thoughtful answers require time to construct.

- Encourage students to think creatively by indicating openness to a variety of approaches and ideas. Frame questions that encourage students to explore several different but appropriate responses.

- Do not penalize incorrect predictions and hypotheses; rather, encourage students to re-evaluate their own responses.

Expert teachers are aware of the need to establish routines in the classroom. Where there is structure and a predictable routine, students gain confidence and the freedom to pursue the work at hand. They know what is happening, what will happen next, and what is expected of them.

Class routines need not be rigid. Once segments of the routine have been

identified and established, there is flexibility in such dimensions as time, focus, pacing, and the degree of participation expected. An everyday routine might include such components as:

First	Review of homework.
Second	Developing skills and concepts, or Presenting variations of previously learned ideas.
Third	Working through sample problems.
Fourth	Independent student work.
Fifth	Assigning homework for the next session.

Evaluation

Evaluation flows from instruction, which is based on objectives. At the classroom level, evaluation is likely to be criterion referenced, with individual programs based on evaluation of student progress on particular objectives. The evaluation and record-keeping procedures suggested in this curriculum guide will help teachers monitor student progress toward accomplishing the objectives, as well as supplying information about any needed program modifications.

Essential Practices in Mathematics

In 1980, the National Council of Teachers of Mathematics (NCTM) recommended that the development of problem-solving abilities should be the major focus of mathematics educators through this decade. This does not mean that teaching should be limited to the math skills needed at particular times to solve particular problems. On the contrary, true problem-solving requires specific knowledge of skills and concepts, as well as awareness of the relationships among them and the fundamental principles that unify them.

NCTM leaders agree that structural unity and the interrelationship of the whole should not be sacrificed. The levels of instruction (pages 95 through 128 are designed to provide that structural unity. Objectives that are interrelated are clustered together in suggested teaching sequences.

Several basic teaching practices can help insure that students are provided with adequate mathematical skills to support the full range of problem-solving. Teachers must:

1. **Help students discover higher levels of mathematical generalization and meaning.**

   a. Utilize and enlarge students's experiences.

   b. Make liberal use of a variety of concrete, manipulative, and investigative experiences.

   c. Provide opportunties and an environment that encourages exploration and discovery.

   d. Help students create and construct mathematical models.

2. **Help students develop an understanding of the structure of math and how to use that structure.**

   a. Provide experiences in organized sequence.

   b. Create situations in which students can discover and relate mathematical meaning.

3. **Help students develop an intelligent mastery of computational skills.**

   a. Provide a variety of guided practice activities, including games, puzzles, and board work.

   b. Provide opportunities for independent practice to the point of overlearning.

4. **Help students develop problem-solving skills as well as an understanding and appreciation of the applications and uses of math in various real-life settings.**

   a. Encourage students to question, experiment, estimate, explore, and suggest explanations.

   b. Help students recognize problem situations, gather data, and choose correct procedures.

   c. Help students use techniques of scientific thinking in solving practical and verbal problems, for instance:

      - o Reading a problem with understanding.
      - o Seeing the problem as a whole.
      - o Seeing the mathematical relationships that exist within the problem and stating them in a number sentence.
      - o Determing the easiest, most practical way to solve the problem.
      - o Checking the reasonableness of their answers.
      - o Solving the problem.

   d. Present problem situations in a variety of forms. Include presentations through activities, graphic models, observation of phenomena, schematic diagrams, simulation of realistic situations, and interaction with computer programs.

5. **Provide for evaluation of student growth and development in the area of meaning (understanding), computational facility, and application.**

   a. Use criterion-referenced tests.

   b. Use standarized achievement tests.

   c. Use textbook tests.
      - o Readiness, pretests
      - o Placement tests
      - o End of unit tests

   d. Use teacher assessments.
      - o Teacher-made tests
      - o Observations of students' daily work
      - o Clinical interviews with students
      - o Analyses of daily written work
      - o Observations of student approaches to problem-solving situations.

   e. Use affective assessments.
      - o Interest inventories
      - o Rating scales
      - o Behavior checklists

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SCOPE AND SEQUENCE OF MATHEMATICS OBJECTIVES

The mathematics objectives are listed by topic strands, and arranged in sequence, levels one through eight. Reading through this section will help clarify the the suggested range of instruction to be covered in each area. The scope and sequence can also be used as a guide to help assess student learning and the levels most appropriate for beginning instruction.

SCOPE AND SEQUENCE OF MATH OBJECTIVES

SETS, NUMBERS, AND NUMERATION (SNN)

Level 1

SNN 1.01	Count by ones from 1 to 5.
SNN 1.02	Recognize the numerals from 1 to 5.
SNN 1.03	Write the numerals from 1 to 5.
SNN 1.04	Order the numbers from 1 to 5.
SNN 1.05	Count by ones from 1 to 10.
SNN 1.06	Recognize the numerals 1 to 10.
SNN 1.07	Write the numerals 1 to 10.
SNN 1.08	Order numbers 1 to 10.
SNN 1.09	Associate a numeral with its printed word name for numbers 10 or less.
SNN 1.10	Recognize and write numbers from 10 to 20.
SNN 1.11	Rename numbers from 10 to 20 as tens and ones.
SNN 1.12	Tell the value of pennies and dimes up to 20 cents.
SNN 1.13	Write the numbers from 1 to 20 in order.
SNN 1.14	Count by tens to 100.
SNN 1.15	Write numbers from 1 to 100.
SNN 1.16	Identify shapes that are divided into 1/2, 1/3, and 1/4.

Level 2

SNN 2.17	Count by ones from 1 to 20.
SNN 2.18	Recognize the word names for the numerals 1 to 20.
SNN 2.19	Order the numbers from 1 to 20 on a number line.

SNN 2.20 Write the numbers that come before and after a number up to 20.

SNN 2.21 Use the ordinal numbers first through tenth to describe a position.

SNN 2.22 Write the standard forms for numbers less than 100.

SNN 2.23 Write expanded notation for a two-digit number.

SNN 2.24 Identify the value of each digit in a two-digit number.

SNN 2.25 Recognize the value of dimes and pennies to 99 cents.

SNN 2.26 Count by twos, fives, and tens to 100.

SNN 2.27 Write the standard number for a given hundred.

SNN 2.28 Count by hundreds to 1000.

SNN 2.29 Write the hundreds in order to 1000.

SNN 2.30 Write the standard form for a number less than 1000.

SNN 2.31 Order numbers less than 1000.

SNN 2.32 Identify 1/2, 1/3, 1/4, 2/3, 3/4, and 1/10.

Level 3

SNN 3.33 Write the standard form for hundreds, tens and ones.

SNN 3.34 Tell the value of each digit in a three-digit number.

SNN 3.35 Write expanded notation for a three-digit number.

SNN 3.36 Read and write the ordinals from first to thirty-first.

SNN 3.37 Convert numbers up to 12 from Arabic to Roman numerals and vice-versa.

SNN 3.40 Identify the numerator and denominator of a fractional number.

SNN 3.39 Write equivalent fractions.

SNN 3.40 Write a mixed number for the shaded part of a region.

SNN 3.41 Write the decimal fraction equivalent of a common fraction with a denominator of 10 (e.g. 2/10 = .2).

Level 4

SNN 4.42 Read standard numbers through 9999.

SNN 4.43 Write standard numbers through 9999.

SNN 4.44 Tell the value of each digit in a four-digit number.

SNN 4.45 Write expanded notation for a four-digit number.

SNN 4.46 Round a number to the nearest 10.

SNN 4.47 Round a number to the nearest hundred.

SNN 4.48 Read and write Roman numerals up to 500.

SNN 4.49 Write multiples of numbers from 1 to 9.

SNN 4.50 Use numbers 1 through 9 as divisors and quotients.

SNN 4.51 Write fractions to name points on a number line.

SNN 4.52 Write a fraction to describe part of a unit of measure.

Level 5

SNN 5.53 Read a standard number through seven places (1,000,000).

SNN 5.54 Write standard numbers through seven places.

SNN 5.55 Order numbers less than 1,000,000.

SNN 5.56 Tell the value of each digit in a seven-digit number.

SNN 5.57 Write expanded notation for a seven-digit number.

SNN 5.58 Read and write Roman numerals up to 1000.

SNN 5.59 Round numbers to the nearest ten, hundred or thousand.

SNN 5.60 Read and write decimals to thousandths.

SNN 5.61 Give the place of any digit in a decimal through thousandths.

SNN 5.62 Order decimals.

SNN 5.63 Round decimals to the nearest whole number.

SNN 5.64 Round decimals to the nearest tenths.

SNN 5.65 Round money amounts to the nearest dollar.

SNN 5.66 Find the greatest common factor of two numbers.

SNN 5.67 Find the least common multiple of two numbers.

SNN 5.68 Find the common denominator for two fractions.

Level 6

SNN 6.69 Read standard numbers through 10 places (billions).

SNN 6.70 Write standard numbers through 10 places.

SNN 6.71 Order numbers less than 1 billion from least to greatest.

SNN 6.72 Tell the value of each digit in a 10-digit number.

SNN 6.73 Write expanded notation for a 10-digit number or less.

SNN 6.74 Round numbers to the nearest tens, hundreds, thousands, or millions.

SNN 6.75 Round money amounts to the nearest hundred dollars.

SNN 6.76 Find the common factor or greatest common factor of two or more numbers.

SNN 6.77 Identify and list prime and composite numbers.

SNN 6.78 Identify and list the prime factorization of a number.

SNN 6.79 Find the common multiple and least common multiple of two or more numbers.

SNN 6.80 Read and write decimals through millionths.

SNN 6.81 Give the place value of any digit in a decimal through thousandths.

SNN 6.82 Order decimals through millionths.

SNN 6.83 Round decimals to the nearest tenth, hundredth, or thousandth.

SNN 6.84 Round a quotient to the nearest tenth, hundredth, or thousandth.

SNN 6.85 Identify positive and negative numbers as points on a number line.

SNN 6.86 Order integers.

SNN 6.87 Identify positive and negative numbers as opposites.

Level 7

SNN 7.88 Read a standard number through 15 places.

SNN 7.89 Write standard numbers through 15 places.

SNN 7.90 Compare and order numbers less than trillions.

SNN 7.91 Tell the value of each digit in a 15-digit number or less.

SNN 7.92 Write expanded notation for a 15-digit number or less.

SNN 7.93 Round numbers to the nearest ten, hundred, thousand, million, or billion.

SNN 7.94 Read and write decimals through millionths.

SNN 7.95 Give the place value of any digit in a decimal through hundred thousandths.

SNN 7.96 Order decimals through thousandths.

SNN 7.97 Round decimals to nearest tenth, hundredth, or thousandth.

SNN 7.98 Round a quotient to the nearest tenth, hundredth, or thousandth.

SNN 7.99 Find the least common multiple of a number.

SNN 7.100 Compare and order integers.

Level 8

SNN 8.101 Change a number from exponential form to standard form.

SNN 8.102 Write a standard number in exponential form.

SNN 8.103 Round whole numbers.

SNN 8.104 Give the value of any digit in a decimal number.

SNN 8.105 Round a decimal to the nearest whole number, tenth, hundredth, thousandth, or ten-thousandth place.

SNN 8.106 Order decimals.

SNN 8.107 Find the greatest common factor of a number.

SNN 8.108 Identify a number as prime or composite.

SNN 8.109 Write the prime factorization of a number.

SNN 8.110 Find the least common multiple of a number.

SNN 8.111 Write equal fractions and write fractions in lowest terms.

SNN 8.112 List integers on a number line.

SNN 8.113 Write integers for a given situation.

SNN 8.114 Compare and order integers.

OPERATIONS AND PROPERTIES (OP)

Level 1

OP 1.01 Recognize plus (+) as the symbol for addition.

OP 1.02 Give sums to 10 for basic addition facts.

OP 1.03 Recognize minus (-) as the symbol for subtraction.

OP 1.04 Give differences for subtraction facts up to 10.

OP 1.05 Complete related addition and subtraction facts.

OP 1.06 Add multiples of tens.

OP 1.07 Add two-digit numbers without regrouping.

OP 1.08 Subtract multiples of tens.

OP 1.09 Subtract two two-digit numbers without regrouping.

Level 2

OP 2.10 Add two two-digit numbers without regrouping.

OP 2.11 Subtract two two-digit numbers without regrouping.

OP 2.12 Memorize basic addition facts with sums to 18.

OP 2.13 Add money amounts up to $ 1.00, without regrouping.

OP 2.14 Subtract money amounts up to $1.00 without regrouping.

OP 2.15 Group a sum into tens and ones.

OP 2.16 Add two two-digit numbers, regrouping ones.

OP 2.17 Add a two-digit and a one-digit number, regrouping ones.

OP 2.18 Regroup a multiple of 10 into tens and ones.

OP 2.19 Subtract a two-digit number from a two-digit multiple of ten.

OP 2.20 Regroup a two-digit number into tens and ones.

OP 2.21 Subtract two two-digit numbers, regrouping tens.

OP 2.22 Add two three-digit numbers without regrouping.

OP 2.23 Subtract two three-digit numbers without regrouping.

OP 2.24 Recognize multiplication as repeated addition

OP 2.25 Recognize times (x) as a symbol for multiplication.

OP 2.26 Write a multiplication fact for a repeated addition sequence.

OP 2.27 Find products involving factors of 5 or less.

Level 3

OP 3.28 Add two three-digit numbers, regrouping ones.

OP 3.29 Add two three-digit numbers, regrouping tens and ones.

OP 3.30 Subtract two three-digit numbers with regrouping.

OP 3.31 Use the inverse operation to check addition and subtraction.

OP 3.32 Multiply two whole numbers using basic facts in both horizontal and vertical forms.

OP 3.33 Develop division facts using repeated subtraction

OP 3.34 Develop division facts using arrays.

OP 3.35 Write related multiplication and division facts.

OP 3.36 Multiply a two-digit multiple of ten by a one-digit number.

OP 3.37 Divide a two-digit multiple of ten by a one-digit number.

OP 3.38 Multiply a two-digit by a one-digit number, with regrouping.

OP 3.39 Divide a two-digit by a one-digit number.

OP 3.40 Find the fractional part of a whole number.

OP 3.41 Add money amounts using dollar signs and points.

OP 3.42 Subtract money amounts using dollar signs and points.

Level 4

OP 4.43 Add three three-digit numbers.

OP 4.44 Add two four-digit numbers.

OP 4.45 Subtract two four-digit numbers.

OP 4.46 Estimate solutions to problems by rounding in addition.

OP 4.47 Estimate solution to problems in subtraction by rounding.

OP 4.48 Use numbers 1 through 9 as factors.

OP 4.49 Check multiplication by using the inverse operation.

OP 4.50 Multiply a two- or three-digit number by a one-digit number.

OP 4.51 Estimate the product of two numbers.

OP 4.52 Multiply money amounts using money notation.

OP 4.53 List factors of numbers less than 20.

OP 4.54 Divide a two-digit by a one-digit number.

OP 4.55 Divide a two- or three-digit number by a multiple of 10.

OP 4.56 Divide a two-digit by a one-digit number (2 steps).

OP 4.57 Write a fraction in its simplest form.

OP 4.58 Add fractions with like denominators.

OP 4.59 Subtract fractions with like denominators.

OP 4.60 Write a fraction as a mixed number.

OP 4.61 Write a decimal for a mixed number using tenths.

OP 4.62 Add decimals using tenths and hundredths.

OP 4.63 Subtract decimals using tenths and hundredths.

Level 5

OP 5.64 Estimate sums by rounding to the nearest ten, hundred, thousand.

OP 5.65 Estimate difference by rounding to the nearest ten, hundred, or thousand.

OP 5.66 Multiply a two-digit number by a multiple of 10 or 100.

OP 5.67 Multiply two two-digit numbers.

OP 5.68 Divide a two-digit number by a multiple of 10 or 100.

OP 5.69 Divide a two- or three-digit number by a multiple of of 10.

OP 5.70 Divide a three- or four-digit number by a multiple of 10.

OP 5.71 Add two or more decimals through thousandths.

OP 5.72 Subtract two decimals through thousandths.

OP 5.73 Add fractions with unlike denominators.

OP 5.74 Add mixed numbers with like denominators.

OP 5.75 Add mixed numbers with unlike denominators.

OP 5.76 Subtract fractions with unlike denominators (no regrouping).

OP 5.77 Subtract a fraction from a whole number.

OP 5.78 Subtract mixed numbers with like denominators.

OP 5.79 Subtract a mixed number from a whole number.

OP 5.80 Subtract two mixed numbers with unlike denominators (no regrouping).

OP 5.81 Multiply a whole number by a fraction.

OP 5.82 Multiply two fractions.

OP 5.83 Multiply a fraction by a mixed number.

OP 5.84 Multiply a decimal and a whole number.

OP 5.85 Multiply two decimals

OP 5.86 Write a fraction as a percent or a percent as a fraction.

OP 5.87 Write a decimal as a percent or a percent as a decimal.

Level 6

OP 6.88 Solve problems that involve rounding in addition, subtraction, multiplication, and division.

OP 6.89 Solve missing addend equations.

OP 6.90 Multiply three numbers.

OP 6.91 Apply the associative property of multiplication.

OP 6.92 Solve equations with missing factors.

OP 6.93 Estimate products using rounded numbers.

OP 6.94 Change a number from exponential form to standard form.

OP 6.95 Write a standard number in exponential form.

OP 6.96 Divide a three- or four-digit number by a two-digit number (two-step division).

OP 6.97 Divide a four- or five-digit number by a two-digit number (three-step division).

OP 6.98 Write equal decimals.

OP 6.99 Estimate sums of decimals using rounded numbers.

OP 6.100 Estimate differences between decimals using rounded numbers.

OP 6.101 Multiply a whole number and a fraction.

OP 6.102 Multiply two fractions.

OP 6.103 Multiply a fraction and a mixed number.

OP 6.104 Multiply two mixed numbers.

OP 6.105 Multiply a decimal by 10, 100, or 1000.

OP 6.106 Multiply a decimal by a whole number.

OP 6.107 Multiply two decimals.

OP 6.108 Divide a fraction by a whole number.

OP 6.109 Divide a fraction by a fraction.

OP 6.110 Divide a fraction by a mixed number.

OP 6.111 Divide a mixed number by a mixed number.

OP 6.112 Divide a decimal by a whole number.

OP 6.113 Divide a decimal by a decimal.

OP 6.114 Add fractions with unlike denominators (regrouping).

OP 6.115 Add mixed numbers with unlike denominators (regrouping).

OP 6.116 Subtraction fractions with unlike denominators (regrouping).

OP 6.117 Subtraction of mixed numbers with unlike denominators (regrouping).

OP 6.118 Write a percent as a fraction in lowest terms.

OP 6.119 Find the percent of a number by using equal fractions.

OP 6.120 Find the percent of a number by using equal decimals.

Level 7

OP 7.121 Evaluate expressions involving addition and subtraction.

OP 7.122 Write expressions for word phrases involving addition and subtraction.

OP 7.123 Compute using the rules for order of operations involving addition, subtraction, multiplication, and division.

OP 7.124 Compute using the commutative property of addition and multiplication.

OP 7.125 Compute using the associative property of addition and multiplication.

OP 7.126 Compute, using the addition property of zero.

OP 7.127 Compute, using the multiplication property of one.

OP 7.128 Compute, using the the distributive property of multiplication over addition.

OP 7.129 Write equal decimals.

OP 7.130 Estimate sums of decimals using rounded numbers.

OP 7.131 Estimate differences of decimals using rounded numbers.

OP 7.132 Add two or more decimals through ten thousandths.

OP 7.133 Subtract decimals through ten thousandths.

OP 7.134 Multiply decimals with two or more places.

OP 7.135 Estimate products of decimals using rounded numbers.

OP 7.136 Divide decimals by whole numbers.

OP 7.137 Identify numbers that are divisible by 2, 3, 5, 9, or 10.

OP 7.138 Identify and list prime numbers and composite numbers.

OP 7.139 Identify and list the prime factorization of a number.

OP 7.140 Divide two whole numbers and give quotient as a mixed number.

OP 7.141 Write a fraction as a decimal and a decimal as a fraction.

OP 7.142 Write a fraction as a repeating or terminating decimal.

OP 7.143 Solve division and multiplication equations using decimals.

OP 7.144 Write a decimal as a percent or a percent as a decimal.

OP 7.145 Find what one percent one number is of another.

OP 7.146 Find a number when a percent of it is known.

OP 7.147 Add postive and negative integers.

OP 7.148 Subtract negative and postive integers.

OP 7.149 Multiply postive and negative integers.

OP 7.150 Divide positive and negative integers.

OP 7.151 Compute with integers using the rules for order of operations.

OP 7.152 Evaluate expressions involving addition and subtraction of integers.

OP 7.153 Write addition and subtraction equations involving integers.

OP 7.154 Evaluation expressions involving multiplication and division.

OP 7.155 Write multiplication and division equations involving integers.

Level 8

OP 8.156 Estimate sums, differences, products and quotients using rounded numbers.

OP 8.157 Compute, using the rules for order of operations involving addition, subtraction, multiplication, and division.

OP 8.158 Estimate sums of decimals by rounding.

OP 8.159 Estimate differences of decimals by rounding.

OP 8.160 Add decimal numbers up to four places.

OP 8.161 Subtract decimal numbers up to four places.

OP 8.162 Multiply decimal numbers.

OP 8.163 Estimate products of decimals by rounding.

OP 8.164 Divide decimals and round quotients.

OP 8.165 Evaluate expressions involving addition, subtraction, multiplication and division.

OP 8.166 Write expressions for word phrases involving addition, subtraction, multiplication and division.

OP 8.167 Apply the identity element for addition and subtraction.

OP 8.168 Apply the commutative property to addition and multiplication.

OP 8.169 Apply the associative property of addition and multiplication.

OP 8.170 Apply the distributive property of multiplication over addition.

OP 8.171 Identify numbers that are divisible by 2, 3, 5, 9, and 10.

OP 8.172 Write an improper fraction as a mixed number or a whole number.

OP 8.173 Write a mixed number as an improper fraction.

OP 8.174 Write a fraction as a terminating or repeating decimal.

OP 8.175 Write a decimal as a fraction or a mixed number.

OP 8.176 Multiply fractions, decimals, and whole numbers.

OP 8.177 Find the reciprocal of a fraction, a mixed number or a whole number.

OP 8.178 Divide fractions, mixed numbers, and whole numbers.

OP 8.179 Find a common denominator for two or more fractions.

OP 8.180 Compare and order fractions and mixed numbers.

OP 8.181 Add and subtract fractions.

OP 8.182 Add and subtract mixed numbers.

OP 8.183 Write percent as a decimal or fraction, and write a decimal or fraction as percent.

OP 8.184 Find the percent of a number.

OP 8.185 Find interest using the formula I = PRT.

OP 8.186 Find what percent one number is of another.

OP 8.187 Find a number when a percent of it is known.

OP 8.188 Find the percent of change between two numbers.

OP 8.189 Find missing numbers in equal ratio and proportions.

OP 8.190 Find the probability of a favorable outcome if all outcomes are equally likely.

OP 8.191 Predict the number of favorable outcomes by multiplying the probability of a favorable by the total number of trials.

OP 8.192 Find the probability of an outcome that involves two or more independent choices.

OP 8.193 Find the probability of an outcome that involves two or more dependent choices.

OP 8.194 Add integers.

OP 8.195 Subtract integers.

OP 8.196 Multiply and divide integers.

OP 8.197 Locate a point on the grid for an ordered pair of integers.

OP 8.198 Give an ordered pair of integers for a point on a grid.

OP 8.199 Graph ordered pairs.

OP 8.200 Find the value of an expression.

OP 8.201 Solve addition and subtraction equations involving rational numbers.

OP 8.202 Use reciprocals to solve equations involving rational numbers.

OP 8.203 Find the square of a number that is a perfect square.

OP 8.204 Multiply square roots.

OP 8.205 Divide square roots.

OP 8.206 Simplify square roots.

OP 8.207 Find the square root of a number using a table.

MEASUREMENT (MEAS)

Level 1

MEAS 1.05 Tell the value of a group of dimes to $ 1.00.

MEAS 1.06 Tell the value of a group of dimes and pennies up to $1.00.

Level 2

MEAS 2.07 Determine the value of a group of coins up to $1.00, using pennies, nickels and dimes.

MEAS 2.08 Identify days of the week

MEAS 2.09 Identify months of the year.

MEAS 2.10 Find specific information using the calendar.

MEAS 2.11 Tell time to the hour and half-hour.

MEAS 2.12 Measure length in terms of centimeters.

MEAS 2.13 Measure length in terms of inches.

Level 3

MEAS 3.14 Write the value of money, using the cent and dollar signs with point

MEAS 3.15 Read a digital clock or watch printout.

MEAS 3.16 Determine the appropriate metric unit for measuring length, using centimeters, meters, kilometers.

MEAS 3.17 Determine the appropriate metric unit for measuring mass, using grams and kilograms.

MEAS 3.18 Determine the appropriate metric unit for measuring volume, using liters and milliliters.

MEAS 3.19 Identify freezing and boiling point of water on a celsuis scale.

MEAS 3.20 Identify freezing and boiling point of water on a fahrenheit scale.

MEAS 3.21 Read and record temperature from celsuis and Fahrenheit thermometers.

Level 4

MEAS 4.21 Round money amounts to the nearest dollar.

MEAS.4.22 Find the value of money amounts up to $10.00.

MEAS 4.23 Make change for money amounts up to $10.00.

MEAS 4.24 Determine the appropriate metric unit for liquid measures using liters and milliliters.

MEAS 4.25 Make conversions among cups, pints, quarts and gallons.

MEAS 4.26 Measure time in terms of minutes and seconds.

Level 5

MEAS 5.27 Choose and measure lengths using centimeters and meters.

MEAS 5.28 Choose and measure weights using grams and kilograms.

MEAS 5.29 Estimate temperatures in degrees celsuis.

MEAS 5.30 Estimate temperatures in degrees farhenheit.

Level 6

MEAS 6.31 Choose appropriate metric measures for length, capacity, or mass (weight).

MEAS 6.32 Given a metric measure of length, capacity, or mass, find an equal measure using a smaller or larger metric unit.

MEAS 6.33 Read a thermometer and choose an appropriate temperature in degrees celsuis.

MEAS 6.34 Given the time in one time zone, find the time in another zone.

Level 7

MEAS 7.35 Choose an appropriate metric measure of length and estimate the length of an object.

MEAS 7.36 Estimate and measure lengths to the nearest centimeter or millimeter.

MEAS 7.37 Find equal measures of length using smaller or larger metric units.

MEAS 7.38 Choose an appropriate metric measure of capacity and estimate the capacity of an object.

MEAS 7.39 Find equal measures of capacity using smaller or larger metric units.

MEAS 7.40 Choose an appropriate metric measure of mass and estimate the mass of an object.

MEAS 7.41 Find equal measures of mass using smaller or larger metric units.

MEAS 7.42 Choose the appropriate celsius temperature for a given situation.

Level 8

MEAS 8.43 Find equal measures of length, using smaller or larger metric units.

MEAS 8.44 Find equal measures of mass using smaller or larger metric units.

MEAS 8.45 Find equal measures of capacity, using smaller and larger units of measure.

GEOMETRY (GEO)

Level 1

GEO 1.01 Identify circle, triangle, rectangle,, and square.

GEO 1.02 Identify shapes that are symmetrical.

Level 2

GEO 2.03 Construct a representation for a circle, square, triangle, and rectangle.

GEO 2.04 Identify a line of symmetry.

Level 3

GEO 3.05 Identify cube, cylinder, cone, sphere, and pyramid.

GEO 3.06 Find the perimeter of a shape.

GEO 3.07 Find the area of a shape by counting square unit.

GEO 3.08 Find the volume of a shape by counting the cubic units that will fit inside.

Level 4

GEO 4.09 Identify points, lines, rays, and angles.

GEO 4.10 Identify a right angle.

GEO 4.11 Identify parallel lines.

GEO 4.12 Identify perpendicular lines.

GEO 4.13 Identify quadrilateral, pentagon, hexagon, octagon.

Level 5

GEO 5.14 Identify congruent shapes.

GEO 5.15 Identify similar shapes.

GEO 5.16 Identify right angles, acute angles, and obtuse angles.

GBO 5.17 Measure angles using a protractor.

GBO 5.18 Find the area of a rectangle using a formula.

GBO 5.19 Find the volume of a box using a formula.

GBO 5.20 Interpert a scale drawing.

Level 6

GBO 6.21 Find the area of a rectangle using a formula.

GBO 6.22 Find the area of a triangle using a formula.

GBO 6.23 Find the area of a circle using a formula.

GBO 6.24 Find the volume of a cylinder.

GBO 6.25 Use scale drawings to find actual lengths.

Level 7

GBO 7.26 Identify congruent segments, and congruent angles.

GBO 7.27 Use a compass and a straightedge to bisect a segment.

GBO 7.28 Use a compass and a straightedge to construct a triangle, given the lengths of its sides.

GBO 7.29 Identify equilateral, isosceles, scalene, right, acute, and obtuse triangles.

GBO 7.30 Find a missing angle measure in a triangle.

GBO 7.31 Find the area of a parallelogram.

GBO 7.32 Find the area of a triangle.

GBO 7.33 Identify the radius, diameter, chord, arc, and central angle of a circle.

GBO 7.34 Find the circumference and area of a circle.

GBO 7.35 Give the number of faces, edges, and vertices of a polygon.

GBO 7.36 Identify a regular polyhedron.

GBO 7.37 Give the numbers and shapes of the faces of a regular polyhedron.

GBO 7.38 Find the surface area of a rectangle or triangular prism.

GBO 7.39 Find the volume of a cylinder.

Level 8

GBO 8.40 Identify points, lines, planes, rays, segments, parallel lines, and perpendicular lines.

GBO 8.41 Measure and draw angles using a protractor.

GBO 8.42 Classify angles as acute, obtuse, and right.

GBO 8.43 Identify and measure vertical angles and adjacent angles.

GBO 8.44 Find the measure of alternate interior and alternate exterior angles.

GBO 8.45 Find the measure of corresponding angles.

GBO 8.46 Bisect and copy angles.

GBO 8.47 Identify congruent segments, congruent angles, congruent polygons, and corresponding parts of congruent polygons.

GBO 8.48 Classify triangles and polygons.

GBO 8.49 Find the missing angle measure in a triangle.

GBO 8.50 Construct congruent triangles.

GBO 8.51 Identify a chord, diameter, radius, and arc.

GBO 8.52 Find the perimeter of a polygon.

GBO 8.53 Find the circumference of a circle.

GBO 8.54 Find the area of a rectangle, square, and parallelgram.

GBO 8.55 Find the area of a triangle and a trapezoid.

GBO 8.56 Find the area of a circle.

GBO 8.57 Find the surface area of a rectangle prism, pyramid, and cylinder.

GBO 8.58 Find the volume of a pyramid or cylinder.

GBO 8.59 Find the volume of a cylinder and sphere.

GEO 8.60 Construct squares on the sides of a right triangle. Find the area of the squares and tell how they are related.

GEO 8.61 Find the length of the sides of a right triangle, given the length of the other two sides.

GEO 8.62 Write the sine, cosine, and tangent of an angle as a ratio.

GEO 8.63 Find the tangent, sine, and cosine ratio using a table.

GEO 8.64 Find the length of the sides of a triangle, using a trigonometry ratio.

RELATIONS, STATISTICS, AND GRAPHING (RSG)

Level 1

RSG 1.01 Determine the group with more and with less, using up to five objects.

RSG 1.02 Determine the group with more and with less, using up to 10 objects.

RSG 1.03 Interpret a picture graph with up to 10 objects.

RSG 1.04 Compare numbers less than 20.

Level 2

RSG 2.05 Interpret information on a bar graph.

RSG 2.06 Compare money amounts up to $1.00.

RSG 2.07 Interpret a bar graph.

RSG 2.08 Construct a bar graph.

RSG 2.09 Compare numbers less than 1000 using <, >, or =.

Level 3

RSG 3.10 Interpret data using a table.

RSG 3.11 Interpret data from a bar graph.

RSG 3.12 Locate points on a grid.

RSG 3.13 Name ordered pairs for points on a grid.

RSG 3.14 Compare two three-digit numbers using <, >, and =.

RSG 3.15 Compare two fractions with the same denominator.

RSG 3.16 Read and interpret a circle graph.

Level 4

RSG 4.17 Compare numbers less than 9999.

RSG 4.18 Interpret information from a table.

Level 5

RSG 5.19 Compare numbers less than 1,000,000.

RSG 5.20 Compare decimals through thousandths using <, >, and =.

RSG 5.21 Compare fractions with unlike denominators.

RSG 5.22 Find the range of a group of numbers.

RSG 5.23 Find the mean (average) of a group of numbers.

RSG 5.24 Find the median of a group of numbers.

RSG 5.25 Interpret information on a double bar graph.

Level 6

RSG 6.26 Compare numbers less than 1,000,000,000.

RSG 6.27 Compare decimals through millionths.

RSG 6.28 Express a ratio in three ways: 2 to 5, 2 : 5, and 2/5).

RSG 6.29 Solve a proportion by using equal fractions.

RSG 6.30 Solve a proportion by cross multiplying.

RSG 6.31 Decide if two ratios are equal by using cross products.

RSG 6.32 Use proportions to estimate distances on a map.

RSG 6.33 Use circle graphs to show percents.

RSG 6.34 Locate a point on a grid for an ordered pair of integers.

RSG 6.35 Give an ordered pair of integers for points on a grid.

Level 7

RSG 7.36 Compare decimals through millionths.

RSG 7.37 Use proportions to find dimensions in similar pologons.

RSG 7.38 Use proportions to compare prices.

RSG 7.39 Use proportions to find dimensions on a scale drawing.

RSG 7.40 Use proportions to find distances on a map.

RSG 7.41 Organize statistical data.

RSG 7.42 Find the mean for a set of data.

RSG 7.43 Find the median and mode for a set of data.

RSG 7.44 Read a broken line graph.

RSG 7.45 Read and interpret a circle graph.

RSG 7.46 Find probability of simple situations when outcomes are equally likely.

RSG 7.47 Write probabilities using a list or tree diagram.

RSG 7.48 Find the number of possible outcomes using multiplication.

RSG 7.49 Estimate probabilities when outcome are not equally likely.

RSG 7.50 Locate a point on a grid for an ordered pair of integers, and give an ordered pair of integers a point on a grid.

Level 8

RSG 8.51 Compare decimals.

RSG 8.52 Find the mean, median, mode, and range for a set of data.

RSG 8.53 Interpret a bar graph or a double bar graph.

RSG 8.54 Interpret a line graph, broken line graph or double line graph.

RSG 8.55 Make a frequency table for a group of numbers.

RSG 8.56 Interpret a histogram.

RSG 8.57 Interpret a circle graph.

RSG 8.58 Prepare a bar graph, line graph, or circle graph using collected data.

RSG 8.59 Graph the solution of an equation on a number line.

RSG 8.60 Complete ordered pairs for an equation.

PROBLEM-SOLVING (PS)

Level 1

PS 1.01 Choose the correct addition or subtraction sentence to match a picture.

Level 2

PS 2.02 Solve everyday word problems involving money amounts up to $1.00.

PS 2.03 Solve word problems involving addition and subtraction of two-digit numbers.

PS 2.04 Find sums using picture/word problems.

PS 2.05 Find differences using picture/word problems.

PS 2.06 Find products using picture/word problems.

Level 3

PS 3.07 Solve addition and subtraction word problems involving one or two steps.

PS 3.08 Write a division problem from a pictured situation.

PS 3.09 Solve word problems using multiplication and division.

Level 4

PS 4.10 Solve word problems using information from a bar graph.

PS 4.11 Solve word problems involving time.

PS 4.12 Solve word problems involving money.

Level 5

PS 5.13 Solve word problem involving rounding.

PS 5.14 Multiply or divide to solve word problems.

PS 5.15 Solve word problems involving money.

PS 5.16 Solve problems using information from a circle graph.

Level 6

PS 6.17 Solve word problems using common multiples.

PS 6.18 Solve word problems using whole number division.

PS 6.19 Solve word problems involving decimals

PS 6.20 Solve word problems involving metric units

PS 6.21 Solve word using scale drawing.

PS 6.22 Solve word problems using equal ratios.

PS 6.23 Use proportions to solve problems involving similar figures or scale drawings.

PS 6.24 Solve word problems that involve interest.

PS 6.25 Solve word problems that involve sales tax.

Level 7

PS 7.26 Solve problems that involve rounding in addition, subtraction, multiplication and division.

PS 7.27 Solve word problems involving addition of decimals.

PS 7.28 Solve word problems involving subtraction of decimals.

PS 7.29 Solve word problems involving decimals.

PS 7.30 Write a proportion for data presented in a word problem.

PS 7.31 Solve word problems that involve interest.

PS 7.32 Solve word problems that involve sales tax.

PS 7.33 Solve word problems that involve discounts.

PS 7.34 Solve problems involving mean, median, and mode.

Level 8

PS 8.35 Solve word problems involving decimals.

PS 8.36 Solve word problems involving multiplication or division of fractions.

PS 8.37 Solve addition and subtract equations involving fractions.

PS 8.38 Solve word problems involving geometric applications.

PS 8.39 Solve word problems involving percents.

PS 8.40 Solve word problems involving concepts of statistics.

3

MATH ACTIVITIES AND EXPERIENCES

Every teacher of math in the elementary school needs to be able to draw upon a series of specific activities that will help students understand and apply key topics in mathematics. This section suggests effective developmental and practice activities and topic applications for all math concept strands and every level of instruction.

As well as helping students learn, the small sample of activities in this section can also serve as models for teachers in the creation of additional activities. All classroom activities, whether adapted from these suggestions or devised by creative teachers, should be aimed at the goal of encouraging students to experience mathematics as it applies to their own lives.

SETS

Developmental Activities

- Have available in the classroom collections of objects (sets of dishes, toys, popcicle sticks) for students to manipulate and describe.
- Have a selection of attribute blocks available so students can sort them into sets.
- Have students group everyday classroom objects like pencils into sets.
- Have students match sets.
- Have students compare sets that have more and fewer members.
- Let students watch as you demonstrate counting members to determine the numbers of objects in sets.
- Have students join and combine sets.
- Have students build a second set that corresponds to a given set.

Practice Activities

- Have students arrange counters in various number patterns.
- Have students draw pictures to illustrate sets.
- Supply students with objects or pictures to separate into groups labeled as sets.
- Have students complete matching activites, matching cardinal numbers to sets by themselves.
- Have students work with pictorial representations of sets, matching element to element.
- Have students match objects with numbers on a number line. The last object covered is the number of objects in the set.
- Have students match set cards to the number of objects in a set.
- Provide opportunities for students to match numbers with configurations.

- Identify sets of objects in the room that have the same number (five chairs, five disks, etc.).
- Play a game of matching picture and number cards.
- Have students complete dot-to-dot activities.
- Construct a number line.

Applications

- Have students apply one-to-one correspondence by passing out papers, choosing partners to line up with etc.
- Ask students to decide the number of books, snacks etc. needed by the class.
- Have students take attendance, counting numbers of students present and absent.

NUMBERS (Counting)

Developmental Activities

- o Ask a number of questions that require students to determine the number of objects in a set. For example: How many students came to school on the bus? How many students remenbered their hearing aids today?
- o Have the class count the number of people present; number of people for snacks; number of chairs needed for the reading group.
- o Display a master counting strip on the classroom wall. Children can use the strip to help them count by ones, twos, fives, and tens.

Practice Activities

- o Count days from the present to some special event.
- o Count objects in the classrrom: Number of textbooks, number of windows, number of desks, etc.
- o Count the number of classrooms on the hallway.
- o Count the number of water fountains in school.
- o Use worksheets with counting activities. Start with numbers higher than one. Have students count on from there.

Applications

- o Count the number of steps from desk to door.
- o Count the number of students in a line.
- o Count the number of minutes it takes the class to line up for an activitiy.
- o Count money.
- o Count candles on a birthday cake.

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NUMERATION (Place Value)

Developmental Activities

- Give each student in the class several popsicle sticks. Do not give each child the same number. Ask the students to group their sticks so that other students can easily tell how many they have. (During this activity some students may group by eights, nines, etc. Discuss how grouping by tens and ones makes it easy to count items quickly.)

- Arrange materials into bags or bundles of tens and ones. Count them and record the numbers on the chalkboard. This kind of paralleling is very important.

- Show how tens and ones are represented by strings of beads, cuisinaire rods, tens-and-ones blocks, stern materials, counting disks, and on a simple abacus.

Practice Activities

- Write numerals and ask students to represent them using tens and ones.

- Have students show tens and ones using place value charts.

- Write standard notations for numbers on chalkboards. Have students tell how many tens and ones make up each number, then write them in expanded form.

- Use some of the many commercial worksheets on place value, or make your own, asking students to circle the correct numbers.

Applications

- Have students count number of stars in flags by circling tens.

- Have students count money using dimes and pennies.

- Ask students to count how many hours a week they spend in school, then round that figure out to the nearest ten.

- Fill a tray with various objects to be counted. Make a chart listing objects by tens and ones. Ask students to count the objects and fill in the chart.

- Have students figure out how many dimes and pennies they need to purchase certain items. For instance, if gum costs 35 cents, how many dimes and pennies does it take to purchase the gum?

ADDITION AND SUBTRACTION (Basic Facts)

Developmental Activities

- Display a set of objects. Show students that a set of five has disjoint subsets of four and one; three and two; or two, two, and one.

- Use familiar objects to make up two sets. Ask students to count the number of things in each set, and the total number of things. Relate addition to combining sets.

- Use familiar objects to make a set. Remove one subset from the set and count the number of objects remaining. Relate subtraction to the separation of sets.

- Use objects like pencils of different colors. Count the total number, and the subsets: "We have nine pencils. Three are red and the rest are yellow. How many yellow pencils are there?" Relate subtraction to the partitioning of sets.

- Also relate subtraction to the joining of sets, using story situations. "Ann has five pennies. How many more does she need to have eight pennies altogether?"

- Use a story situation to relate subtraction to comparison. "Bob has three balloons; Jane has seven balloons. How many more balloons does Jane have than Bob?"

- Develop number facts by learning "one more" facts. Start with concrete objects.

- Develop number facts using doubles. Use objects or games that involve doubles or pictures of symmetrical objects, such as a tree with three branches on each side, or people with five fingers on each hand.

Practice Activities

- Draw a number line on the chalkboard. Have students practice adding by counting on—locating one addend, then counting from there.

- Make an "in-out machine" from a shoe box. Put two sets of objects in the machine, and find out how many will come out.

- Have the class play missing number games. Write two of three numbers for a simple addition problem and ask students to fill in the third. For example: 6 + ___ = 11; ___ +, 3 = 5; 2 + 4 = ___.

- Have students write addition facts to match subtraction facts. For example: 12 - 5 = 7, or 7 + 5 = 12.

- Have a five-minute daily drill on basic facts. Emphasize that excessive speed is not necessary but that reasonable speed is important.

- Use some of the many commercial worksheets available for practicing basic addition and subtraction facts.

Applications

- Add up scores when playing a game.

- Keep a running balance of savings.

- Add the number of girls and boys present in the room.

- Find the total cost of two objects.

- Find the total numbers of various kinds of school supplies.

MULTIPLICATION AND DIVISION (Basic Facts)

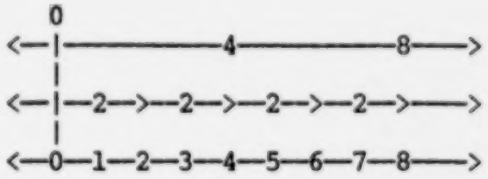
Developmental Activities:

- Model multiplication using arrays. Use plastic tiles projected on an overhead screen to form an array (example: 2 x 4 = 8)

  o o o o
  o o o o

- Model multiplication using a number line. All students should have number lines taped to their desks and covered with acetate. When using the number line, always use zero as a starting point.

Example: 2 x 4 = 8



- Model multiplication as repeated addition: write the problem 2 x 4 as 4 + 4 = 8. Students can also use counters to represent numbers in a problem.

- Division is the inverse of multiplication. Use the examples above to illustrate division facts.

Practice Activities

- Have students use counters to make equivalent sets. Then write multiplication sentences to represent the sets.

- Play various games using flash cards with basic facts.

- Provide drill sheets with the basic multiplication and division facts. The drills can be timed or not.

- Make division and multiplication wheels; use for individual practice.

Applications

- Have students solve word problems requiring knowledge of basic facts of multiplication and division

FRACTIONS (Concepts)

Developmental Activities

- Take an apple or an orange and cut it into two equal-size parts. Discuss the concept of half an apple, and the fact that two halves make a whole.
- Make sets of congruent parts of circular or rectangular regions to show fractional numbers. Make them of flannel or cardboard covered with flannel, and have students place them on a flannel board.
- Let students experiment with dividing materials in half—pieces of string, sheets of paper, ribbon, etc. It is important to say or sign "one half" while halving objects.

Practice Activities

- Give students rectangular pieces of paper and have them cut the papers into halves. Encourage them to experiment with various ways of doing this—cutting the paper horizontally, vertically, or diagonally.
- Have students look through books and magazines and select pictures that illustrate halves.
- Provide worksheets that ask students to color halves of pictures.
- Give students counters and have them separate them into halves.
- Have students fold papers in half.

Applications

- Fold papers into halves for classwork.
- Cut sandwiches into halves at lunchtime.
- Drink a half glass of milk for snack or lunchtime.
- Share half a cookie for lunch or snack.
- Share school materials: give half a box of crayons to a friend.
- Ask half of the class to form a line.

FRACTIONS (Equality)

Developmental Activities

- Use rectangular flannel cutouts to show equivalent fractions.
- Use calibrated number lines of equal length. Divide one in halves, one in fourths, and one in eighths.
- Have students fold paper to create congruent line segments. Students should discover that several fractions can be represented by the same length.
- Use some of the many commercial materials available that show equavalent fractions: fraction bars, pizza pie kits, etc.

Practice Activities

- Have students construct their own fraction charts as follows: Using unlined paper, draw five horizontal line segments across the paper with a straight edge. Then fold the paper down the center the long way to create two congruent rectangular regions. Calibrate number lines in halves, fourths, eights and sixteenths.
- Prepare an equivalent fraction chart, or have the students construct one. When completed, students should write all the equivalent fractions they see.

Applications

- Divide a pound of butter into fourths. Ask students to point out 1/2 pound of butter. Given one dozen eggs, ask students to count out 1/2 of the dozen. Students should be able to state such equivalents as: $2/4 = 1/2$; $6/12 = 1/2$.
- Have students measure liquids with equivalent measuring tools. For example, ask for 1/4 cup of oil. Give students an 1/8 cup measure, and ask them to determine how many measures are needed to make 1/4.
- Use uncommon fractions in daily classroom discussions. For instance, instead of asking 1/2 of the students to line up, you might ask for 3/6. Students should be able to determine that it is equivalent to 1/2 of the class.

FRACTIONS (Addition and Subtraction)

Developmental Activities

- Cut circular regions into congruent parts. For example, cut a circular region into four equal parts. Take two pieces that equal one-fourth each, add them together, and state that one-fourth and one-fourth equal two-fourths. Write the algrorhythm on the chalkboard as a step-by-step method.

- Fraction bars, drawings, and numbers lines can be used to represent the addition and subtraction of fractions.

Practice Activities

- Using a model, have students show both addends and the sum.

- Give students a series of addition and subraction problems. Ask them to write the denominators in words, then solve the problems. For example, 1/5 + 3/5 = ___. Students should write 1 fifth + 3 fifth = 4 fifths.

- Use some of the many commercial worksheets that are available or create your own practice exercises for adding and subtracting fractions.

Applications

- Double the recipe for a dish to serve a specific number of people.

- Reduce a recipe for a dish to serve a specific number of people.

FRACTIONS (Multiplication and Division)

Developmental Activities

- Multiplying a fraction by a whole number can be interpreted as repeated addition. Use a realistic situation like: Ann has 3/4 hour of homework every school night. How much time does she spend on homework each week? This situation can be interpreted using geometric regions, function strips, number lines, or cuisinaire rods.

- Multiplying one fraction by another can be demonstrated using two transparencies. Prepare two transparencies, each representing one of the fractions as a geometric region. Overlap the two transparencies. The part of the regions that overlap is the solution to the multiplication problem.

- Multiplication of mixed numbers should be taught when students can handle it at an abstract level.

- Division is also best taught at the abstract level. Introduce the algorithm for division of fractions.

Practice Activities

- Have students draw an array of models to solve problems involving multiplication of fractions and whole numbers.

- Have students show multiplication of fractions using a number line.

- Provide a commercial or teacher-made worksheet to let students practice solving problems using the algorithm for multiplication of fractions.

Applications

- Have students find fractions of an hour. For example, how many minutes are in a half hour?

- Have students double or reduce recipes.

- Ask students to find fractions of a dollar.

DECIMALS (Concepts & Notation)

Developmental Activities

- Use base-10 models to show the relationship between tens and hundreds. Demonstrate how one tens strip represents 1/10. Show students how to express the fraction 1/10 in decimal form.
- Use base-10 models to show the relationship between units, tens, and hundreds. Be sure students see how one unit square is 1/100. Show them how to express the fraction 1/100 in decimal form.
- Color different parts of unit rectangular and circular regions. Designate the colored area as both a decimal and a fraction.
- Construct and study number lines.
- Use a pocket chart to show decimals.
- Use an abacus; locate a decimal point to the left of the right-hand row.

Practice Activities

- Have students draw diagrams to represent different decimals.
- Prepare a worksheet for changing fractions to decimals and vice versa.
- Have students color fraction strips to show different fractions.
- Use a commercial worksheet to help students practice decimal concepts.
- Have one student select a physical representation for a decimal, with another student writing the decimal.

Applications

- Have students check the classroom for fractional situations involving tenths.
- Have pupils make rain dials from cardboard. Provide paper fasteners to hold the pointers in place. Show them how to use their dials to solve problems.
- Have students take odometer readings from their family cars.
- Have class keep a height record. Take heights once a month and record them in centimeters and tenths of centimeters.

DECIMALS (Addition & Subtraction)

Developmental Activities

- Use base-10 models to display two decimals. Ask students what the sum would be. Then write the problem on the chalkboard in decimals. Compare to base-10 models.
- Follow similar procedures to develop subtraction of decimals.
- Show sutdents the proper alignment for writing decimals in addition and subtraction. Stress the proper placement of the decimal point.

Practice Activities

- Have students add and subtract money amounts.
- Using an odometer or a pedometer, have students add and subtract to determine distances.
- Develop a worksheet, or use a commercial worksheet to provide practice in adding and subtractng decimals.

Applications

- Have students find the cost of several items using a grocery list and a supermarket ad.
- Have student make "wish lists." Then use store catalogs to determine how much the items would cost.
- Have students compute the cost of one-way and round-trip airline tickets using a travel ad.
- Have students figure the cost of lunch at a fast food restaurant.
- Have students figure the difference in cost of making a long distance telephone call using two different long-distance companies.

DECIMALS (Multiplication & Division)

Developmental Activities

- Use base-10 blocks. The flat, representing 100s, should be defined as 1. The long, which represents 10s, is defined as 1/10. The unit, which is 1, is defined as .01. Use the blocks to set up an array. Write the algorhythms as step-by-step methods.

- The same prodecure used to teach multiplication of whole numbers can be used here to teach decimal multiplication.

- Present decimal division with a whole-number divisor, and use money to represent the dividend. As you work with the money, write the algorithm as a step-by-step record.

Practice Activities

- Give students graph paper, and have them partition off unit regions into 10 or 100 congruent parts. Shade in the regions that represent the multiplication problem. Count squares to determine the product.

- Use some of the many commercial worksheets avaliable for practice in the multiplication of decimals.

- Provide commercial or teacher-made worksheets on division of decimals. Have students use algorithms to find solutions.

- Ask students to find the number of nickels in a sum of money. Students must write five cents as a decimal, and use it to divide a given amount of money.

Applications

- Have students compute the cost of running various small home appliances. This is done by multiplying the number of Kilowatt hours the appliance is used by the cost per Kilowatt hour.

- Find the cost of gas for a trip by computing miles per gallon, then multiplying by the cost per gallon.

- Find the average cost of a group of items.

- Find the unit cost of an item.

- Find the total cost of several items.

- o Compute average rainfall for a given period of time.
- o Figure batting averages for baseball players, using newspaper accounts.
- o Given the number of gallons of gas used, and the miles driven, compute the number of miles per gallon.

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PERCENTS (Concepts)

Developmental Activities

- o Display percents visually, using a hundreds board. Emphasize that percent (%) means hundredths.
- o Use a hundreds board and colored disks to demonstrate numbers per hundred. For example; to show 18 out of 100, cover 18 squares with red disks and 82 with blue.
- o Give students copies of 10 X 10 squares. Tell them that each square can be considered one one-hundredth. For example, to show 15 percent, students would color in 15 squares. Let students know this can be recorded as .15, 15/100, and 15 percent.
- o Display a rectangular graph in which 100 percent represents the whole.

Practice Activities

- o Using grids of 100 squares, have students shade in squares to represent various percents.
- o Using grids of 100 squares, color in various percents. Ask students to identify the percents represented.
- o On a hundreds board, have students use tags to represent different percents.

Applications

- o Have student read clothing labels to determine fabric content.
- o Ask students to look through daily newspapers for uses of percents. Have them cut out the articles, bring them to class, and explain how the percents are used.
- o Use newspaper statistics to evaluate the results of a football game.

INTEGERS (Number & Notation)

Developmental Activities

o Create a decimal number line, as an extention of the number line for whole numbers, as follows:

Mark several equally spaced dots on the floor in the front of the classroom. Give numbered cards to several students (-1, 1, 0, - 2, 2, etc.). Ask the student having the zero card to stand on a central dot. The others should then arrange themselves in relationship to zero.

One variation would be to ask students with cards other than zero to position themselves first, then let the others arrange themselves in order.

Practice Activities

o Give students worksheets marked off in number lines with unlabeled points. Students should complete the labeling according to various instructions from the teacher.

Application

o Bring in examples of integers from everyday life. List them in a chart on the bulletin board. Examples may include such things as : Stack A gains 3 points (+3) and stack B loses 3 points (-3).

o Have students list possible uses of negative numbers, for instance: Jim owes $10 (-10); Amy lost $5 (-5); 1 week ago (-7).

OPERATIONS AND PROPERTIES

INTEGERS (Addition & Subtraction)

Developmental Activities

O Draw a number line on the chalkboard. Review the positions of positive and negative numbers on the number line. Use a frog to illustrate moves on the number line. Help students generalize that positive integers require a move to the right and negative integers mean moving to the left.

o Make up stories about the frog. Illustrate the incidents on the number line.

Practice Activities

o Practice is not recomended when addition is first introduced. The relationship between the addition of whole numbers and the addition of integers should be discovered by students.

Applications

o Solve problems related to temperature involving addition of integers.

o Construct a problem to illustrate a statement about integers.

TEMPERATURE

Developmental Activities

- Have available real thermometers and containers of hot water and ice water. Let students observe the mercury in the thermometer. Mark the mercury level with tape. Place the thermometer in hot water; demonstrate how the mercury moves up. Repeat with the ice water; let students watch the mercury go down.

- Have students blow on thermometers, then report their findings. Class should brainstorm ways to make the mercury rise and fall in thermometers.

- Discuss where and how thermometers are used.

- Allow students to experiment and observe parts of the thermometer.

- Demonstrate notations used to record temperatures.

- Discuss freezing and boiling points.

- Discuss comfortable temperatures for human beings.

- Invite the school nurse to class for a discussion of body temperature and ways to record it. Show students how to take oral temperature.

Practice

- Ask students to cut pictures showing hot and cold temperatures from magazines. Group them on sheets labeled hot or cold.

- Make lists of hot-weather and cold-weather activities.

- Prepare a worksheet depicting a variety of activities. Ask students to decide whether they are done in hot or cold weather.

- Prepare worksheets with blank thermometers. Have students read and record the actual temperature.

Applications

- Display a chart of daily temperatures for the month. Have students record the morning temperature each day during the month.

- Have students locate the newspaper weather report and record the daily temperature.

- Have students choose appropriate clothing, based on weather conditions.
- Help the class bake cookies, with students responsible for setting oven temperature.
- Ask students to keep a record of temperatures and weather conditions for a five-day period, then predict the weather for the next five days.
- Have students predict the next day's weather, then compare with the TV weather forecaster. Who comes closest?
- Ask students to look at temperature and weather conditions in five different places, and decide what kind of clothing is appropriate for those locations.

LENGTH

Developmental Activities

- Have students compare the length of two or more objects by matching them physically.
- Demonstrate how to measure length in non-standard units. Emphasize end-to-end placement. Mark, label, and count units.
- Have students measure objects using several different non-standard units.
- Demonstrate one centimeter. Compare size of a centimeter to the width of a student's little finger.
- Have students estimate the length of an object, then measure it, using their little fingers as aids.
- Demonstrate one inch. Compare an inch to the distance between two knuckles.
- Have students measure the length of several objects, using their knuckles as aids.
- Select several round objects to be measured. Have students wrap yarn around the objects, then cut the yarn where the ends meet. Measure the yarn using centimeter and inch scales.

Practice Activities

- Have students measure familiar objects in the classroom using centimeter and inch rulers.
- Have students measure each others' wrists, necks, waists, and other areas. See whether they notice a pattern in the measurements.
- Set up a measuring table. Line up several objects with file cards under them. Ask students to measure the objects and record the lengths on the file cards.
- Have students cut yarn to various lengths as directed by teacher.
- Have students measure various objects at home, record the measurements, and compare them with measurements taken by other students.
- Ask students to list things that can be measured in centimeters, in inches.

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- Have students select and measure objects in meters: the hallway, the classroom, the chalkboard, etc.

- Have students prepare a chart lising things that can be measured in centimeters and in meters.

- Have students measure every pencil in the classroom and record findings—from shortest to longest.

- Measure the height of everyone in class. Write the heights in order from shortest to tallest.

Applications

- Draw a design or a map. Show students how to use graph paper to make copies of your drawing. Give precise directions as needed: "Count five squares. Draw a line from left to right that is 5 cm long.

- Construct models that require measuring and cutting.

- Have students run, jump, throw balls. Measure the distances and record the results.

- Have students follow directions to draw various shapes. Give the measurements to be used; i.e., "Draw a rectangle that is 3 cm by 4 cm."

- Plan a bulletin board and decide how much paper is needed to cover it.

CAPACITY

Developmental Activities

- Collect containers of several different sizes. Demonstrate direct comparison of capacity by having students pour materials from one container to another to determine which container holds more. Have them experiment with various materials: dried beans, rice, sand, water, etc. Ask students to estimate first, then check their estimates by measuring.

- Use non-standard units of capacity (cups from toy tea sets, lids from aerosol cans). Ask students to count the number of times the units are used. Students should estimate capacities, then check their estimates.

- Introduce liters and milliliters. Have students measure using standard units.

- Have students collect containers they think will hold one liter, then fill the containers to check their estimates.

Practice Activities

- Make worksheets with pictures of various containers. Ask students to indicate which containers will hold more than one liter and less than one liter.

- List a number of objects commonly used in the home: teaspoon, bathtub, coffee pot, pail, etc. Have students place the objects in the order of capacity, from the one that will hold the most to the one that holds the least.

Applications

- Make pumpkin bread or a similar recipe. Have students measure amounts of flour, milk, flavoring, and other ingredients.

- Take students to a grocery store and have them list items that are sold by liters and milliliters.

- Have students measure water for class pets.

- Show students how to make soap bubbles by mixing two parts liquid detergent to one part water.

- Help students plan a party. Have them estimate the amount of punch or juice they will need, make the necessary measurements, and prepare the drink.

CALENDARS

Developmental Activities

- Print days of the week on large rectangular tag boards. Display them in order.
- Each morning, ask students to identify the day of the week. Write it in large print on the chalkboard. Leave it there all day.
- Draw a large calendar on chalkboard. Give students copies of blank calendars. Have students fill in the days of the week on their calendars. Laminate calendars so that they can be used daily. Ask students to fill in the whole month, noting class birthdays, holidays, and special events.
- Help students build a vocabulary of calendar words such as today, tomorrow, and yesterday.
- Each month, display a large calendar for the class to refer to.

Practice Activities

- Sign/sing songs that involve days ofthe week.
- Play hopscotch using days of the week, rather than numbers.
- Write the names of the days on cards that fit into a calendar board. Have students place the cards in their proper slots.
- Ask students to place the days of the week in sequence.
- Ask students to place the months in sequence.
- Have students observe the number of days in each month.
- Prepare calendar worksheets for each month. Ask questions about various dates that fall during the month.
- Have students find dates on publications and letters.

Applications

- Have students mark days on the classroom calendar.
- Ask students to write the date on all classwork.

- o Have students locate the birthdates of classmates and of famous people.
- o Graph students' birthdays by months.
- o Have students keep a journal of their activities for a month, jotting down on a calendar any special activities and events that happen.
- o Use a TV guide to locate favorite programs and the days they are shown.
- o Determine the length of time between the present and various special events: how many days (months, weeks) until birthdays, Christmas, school's end, etc.

MEASUREMENT

TIME

Developmental Activities

- Have students observe several clocks, noting markings, numbers, hand size, and speed.
- Display a large clock with numerals 1 to 12. Explain that each number represents an hour. Put the hour hand on 12. Explain that the hour hand moves competely around the clock twice in one day: midnight-noon-midnight. Relate time to school activities.
- Display a digital clock. Explain that the first number tells the hour and the last two numbers give the minutes. Show 12:00 on a digital clock and on a clock with hands.
- Supply model clocks for students to manipulate. Direct them to show various times.
- Identify times associated with location of the minute hand at six.
- Explain concepts of before and after the hour.
- Identify the four areas of the clock as quarters or fourths. Have students fold paper clocks into fours.
- Work with students to identify times associated with placement of the minute hand at three and nine.
- Have students count the minute marks on a clock to show that an hour has 60 minutes.
- Demonstrate the movement of a clock through an hour's time, labeling time to the nearest minute. It may be helpful to students to know that recognizing multiples of five and counting from there makes it easier to count minutes.

Practice Activities

- Have students classify pictures by time of day: morning/afternoon, day/night.
- Have students practice setting time to the nearest hour, using model clocks.
- Synchronize clock hands with a digital clock. Have students tell the time.
- Write time to the hour on the chalkboard; ask students to set their clocks to that time. Do the same for times to the half hour.

- Provide worksheets with clock faces set for various times. Ask students to write the correct time shown under each clock.

- Have students practice writing time in two forms: 3 o'clock, 3:00.

- Have students count the number of hours between two times. For instance: How many hours between 12 noon and 3 pm?

- Make up a worksheet listing activities and various times of day. Ask students to choose a reasonable time for each activity. For instance, when would you do homework? 12 midnight; 7:30 pm; or 5:30 am?

Applications

- Use time vocabulary in conversation. Emphasize time scheduling to help students see time as functional.

- Relate general statements of time to such events as before lunch, after recess.

- Have students record activities that require only minutes of time (washing hands, eating an apple, etc.), and activities that require hours (driving to the beach, a day at school, etc.).

- Have students list school or other activities that begin on the hour, on the half-hour.

- Have students check TV guides for favorite programs that are one hour and one-half hour long.

- Ask students to make daily listings of their favorite shows—what time they start, and how long they last.

- Have students chart how much time they spend watching television each day for a week

- Have students figure the number of hours between two activities, for instance, between lunch and school dismissal.

- Given an activity, the time required to do it, and the time it must be completed, ask students to figure out when the activity should be started. For instance, it takes 30 minutes to walk home. You must arrive by 4:00 pm. What time should you begin walking home?

- Have students estimate the time they need to complete various activities: brushing their teeth, eating lunch, taking a shower, etc.

- Have students estimate the time it takes to do their home chores, then time themselves. Record and compare the information.

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MONEY

Developmental Activities

- Have available all denominations of U.S. coins. Let students handle and observe coins and note their similarities and differences.
- Identify coins by name. Have students repeat and observe.
- Build a chart of various coins, their names and their values.
- Make a chart of things that can be bought with each coin.
- Using real coins, let students set up equivalences; e.g., five pennies equal one nickel.

Practice Activities

- Write varying amounts of money on blank envelopes. Ask students to place correct amount of coins inside.
- Give students worksheets that list the values of all coins. Have students use money stamps to stamp pictures of coins next to the appropriate amounts.
- Put specific amounts of money--all coins—in small containers. Label each container. Have students count the coins in each container and write down the correct amounts of money.
- Mark cards with monetary amounts. Ask students to draw coins on the cards that represent the right amount of money.
- Have students count to twenty-five in pennies, to fifty cents in nickels, and to one dollar using dimes.

Applications

- When money is brought to school for such purposes as snacks, milk, lunch, or field trip expenses, have students help count it.
- Set up an "auction" in which students bid for items or privileges, then must pay the correct amounts of money.
- Set up a store in which students use coins to pay for objects.

- Set the cost of such items as soft drinks, candy, etc. Students must find as many ways as possible to make up that amount in coins. Have students record their results.

- Have students make change for purchases of less than $1.00.

- Cut pictures from magazines of items under $1.00; write prices under them. Have students choose the items they would like to purchase and write which coins they would use to pay for them.

- Have a one-cent sale, in which people who buy items at the regular price may have a second item for one cent. Prepare a worksheet of various items with prices marked. Ask students to compute the cost on a one-cent sale of two items of the same price.

- Set up "stores" offering identical items at different prices. Have students make lists of items to purchase, then choose the store that offers the best buy for each item.

NON-METRIC SHAPES

Developmental Activities

- Start a class collection of shapes. Put in a few objects yourself (a can, a box, a funnel) and invite students to bring in other items.
- Discuss properties of the objects in the collection. Have students sort them into categories: box shape, can shape, cone shape, and ball shape.
- Introduce models of shapes and their proper names. Then display them with labels.
- Have students construct specific shapes with blocks.
- Have students cut shapes from paper.
- Place models of shapes in a box. Have students reach in and identify shapes by touch.
- Observe classroom objects with various shapes.
- Have students make circles using strings or by drawing around the tops of cans.
- Have students discover the properties of shapes by examing the numbers of corners, sides, and faces in various shapes.
- Explore the concept of line by stretching a string as far as it will go.
- Differentiate between a line and a line segment.
- Tape a string to the chalkboard. Explain that its called a point. Have students run their fingers along the edges of their books. Explain that all the points along the edge form a line segment.

Practice Activities

- Collect pictures illustrating shapes.
- Find various shapes in the school environment; label them.
- Label shapes taken from a collection of attribute blocks.
- Draw lines and line segments, making segments in different positions.
- Have students follow written instructions. Prepare a worksheet with

directions, for instance: color the circles yellow, color the triangles red.

- o Prepare a worksheet headed: Circles, Triangles, Squares, and Rectangles. Ask students to list as many familar objects as they can think of under each heading. For example, under rectangle they might list envelope, book, window, door, etc.

- o Using basic shapes as patterns, make sandwiches for lunch or a snack.

Applications

- o Arrange chairs in a circle for reading time.

- o Fold napkins for snack time into triangles or rectangles.

- o Draw shapes outside for games.

- o Arrage a bulletin board display of pictures representing various shapes.

- o Use specific shapes to draw houses, wagons, etc.

- o Cut paper into various shapes to make houses, wagons, people, cars, etc.

SYMMETRY

Developmental Activities

- Demonstrate symmetry or balance in shapes by using pattern work for arts and crafts. Develop a "blot" pattern by folding a plain sheet of paper. Open and drop a little paint in the fold. Fold the paper again and press it carefully all over. The shapes on each side of the fold should be symmetrical.

- Have students find symmetry by tracing around real leaves.

- Paper folding can help illustrate symmetry. Have students fold paper into rectangles, other polygons, various kinds of triangles, and circles.

- Use cuisinaire rods and other structural materials to make symmetrical patterns.

Practice Activities

- Mirror cards are a commercial material consisting of small mirrors and printed cards. In a study of symmetry, students can determine how to place mirrors on cards to match patterns shown on other cards.

Application

- Collect pictures that illustrate symmetrical figures.

- Encourage students to collect natural objects having symmetrical shapes: leaves, butterflies, etc.

MEASURING LINE SEGMENTS AND ANGLES

Developmental Activities

- Have students measure line segments to find the longest and the shortest.
- Have students measure angles with a non-standard unit. They can cut the unit from cardboard.
- After students understand the principle of measuring angles, introduce standard measurement practice. Use a large demonstration protractor or a clear plastic protractor with an overhead projector. Explain the meanings of the marks and numerals on the protractor.

  Measure several angles on the blackboard or the screen. Emphasize that the vertex of the angle should line up with the designated point on the protractor, and that one side of the protractor should line up with the 0 degree mark.

Practice

- Have students measure angles and classify them according to size.
- Ask students to draw several angles on paper, then exchange papers. Using protractors, students should measure and write the degrees of the angles drawn by other students.
- Find pictures of a square, a rectangle, and two different kinds of triangles. Use a protractor to measure all the angles. Find the total number of degrees for each figure.

Application

- Construct a sundial. Compare sundials and clocks.
- Explore the angle of reflection in a mirror. Have students explain how angles can be used to demonstrate how mirrors work.
- Have students examine the effects of the angle of a baseball bat with respect to the direction of a pitch.
- Make a scale drawing of a bedroom, and plan the best use of its space.

MEASURING AREA

Developmental Activities

- Use geoboard to develop formulas for finding the areas of rectangles and squares. Give each student a geoboard and several rubber bands. Use a transparent geoboard and an overhead projector to demonstrate how rubber bands are used to form specified figures. Discuss the length and width of each figure, and find its total area.

- When students understand how to find the area of rectangles using a formula, they are ready to understand area formulas for other quadrilaterals, triangles, and circles.

  To find the area of a triangle, begin by drawing a diagonal in a rectangle. Help students generalize the answer: the formula for a rectangle is A = B x H; therefore, for a triangle, the formula would be A = 1/2 BH. Try this formula with a few examples. Verify the results by using the original triangle and a copy of it to form a rectangle.

- To find the area of a circle, give each student a sheet of grid paper containing several circles of different diameters. Have students count the number of squares inside each circle to estimate its area. Follow up by using the formula to find the area of each circle.

Practice Activities

- Have student measure any five rectangular areas in the classroom: books, tables, etc. Make a chart to record the width, length, and area of each rectangle.

- Have students draw rectangles, squares, and triangles, then exchange papers to measure the area of each figure.

- Draw various figures on grid paper and ask students to find the area of each figure.

Application

- Have students estimate the size of paper needed to wrap boxes of various sizes.

- Ask students to estimate the amount of carpeting to cover a specific area.

- Have students measure the area needed to play various sports.

MEASURING VOLUME

Developmental Activities

- Have available a set of 1 cm. cubes and a number of small shallow boxes. Ask students to fill their boxes with 1 cm. cubes and record the count.

- Using a sheet of paper marked in square centimeters, cut out and make a box. Record the width, length, and height of the box by counting squares. Fill the box with cm. cubes, and check whether the count is the same. Present the formula: Volume = area of base x height (or V = LWH).

Practice Activities

- Provide students with 24 cm. cubes. Have them arrange the cubes to form rectangular prisms. Record the height, length, and width of the prisms. Rearrange the cobes to form different prisms and record their dimensions. Note that the product of all the prisms is 24.

- Have students fill shallow boxes with sugar cubes. Count the number of cubes in each box. Compute volume by using the actual measurements of the boxes, then compare.

Applications

- Find the capacity of a storage cabinet.

- Estimate how many books can be stored in a box.

RELATIONS, STATISTICS, AND GRAPHS

COMPARISON

Developmental Activities

- Give each student an object. Ask them to compare their objects with those of other students to find things that are the same.
- Provide paper strips, straws, or sticks of various lengths for students to compare.
- Have students put objects in sequence, from shortest to longest.
- Ask students to compare the numbers of people in their families. Have them bring in family snapshots to aid the dicussion.
- Have students predict which of two objects is lighter or heavier. Check predictions.
- Fill containers with liquid. Discuss which container has more; which has less.
- Compare sets of objects in terms of more and less. Have students use one-to-one correspondence to determine relationships.
- Have students circle two numbers on number line. Help students realize that the number on the left is always less than the other on a number line. Conversely, the number to the right is always greater.

Practice Activities

- Read a series of numbers to the class. Ask students to write the numbers in the order given, putting "greater than" or "less than" symbols between pairs.
- Prepare flash cards with numbers 1 to 99. Have the class form two teams. One member of each team draws a card. The greater number wins a point for that team.
- Prepare a worksheet with a series of items, each having two numbers. Ask students to circle the greater or the smaller number of each pair.
- Write two 2-digit numbers on the board. Ask students to use base-10 blocks to illustrate each number, then record the numbers on paper and place the correct symbol between them.

Applications

- Draw a chart of shoes on the chalkboard. Divide the chart into tennis shoes and others. Have the class count the number of students wearing each type. Enter the information on the chart and compare numbers.

- List the teachers in your school or department. Enter the number of students in each class. Ask students to compare: Which teachers have the largest and smallest classes? Do many teachers have the same number of students?

- Prepare a "better buy" worksheet. List similar objects with different prices. Ask students to choose the "better buy" for each item.

- Prepare a second "better buy" worksheet. List similar items of the same price but different quantity. Again, ask students to choose the "better buys."

STATISTICS (probability)

Developmental Activities

- Introduce the concept of probability as the likelihood of certain things happening. For example, Ann is a very good student. Which is she more likely to do on tomorrow's test--pass or fail? Which are you most likely to need in November--a T-shirt or a sweater?

- Put two beads of the same size and weight but different colors in each of several bags. Let students work in pairs. One student should remove one bead each time for 100 drawings, while the other makes a simple chart to show which color is drawn each time. When all groups have tabulated the results of 100 drawings, make a master chart to record all the accumulated data. The master chart should provide evidence to support the conclusion that the probability for choosing each color is one in two.

Practice Activities

- Toss thumbtacks into a container and keep a record of the positions in which the tacks land. Do this several times. Based on the evidence, estimate the probability of a thumbtack coming to rest in each position.

- Using a spinner from a board game, have students spin the pointer and record the results. When this activity is carried out over a period of time, each number should occur about the same number of time, or with the same probability.

Applications

- Bring in a selection of sweepstakes materials. Have students read the fine print to determine the probability of winning the various prizes advertised.

- Discuss state or local lotteries and estimate the odds for winning.

- Use a series of newspaper weather reports to predict the probability of rain or other weather conditions in your area.

STATISTICS (Mean, Median, and Mode)

Developmental Activities

- Introduce the concept of mean or average through activities using blocks. Divide the class into several groups. Give each group two large stacks of blocks. Have them divide the blocks into three, four, or five equal stacks.

- Illustrate the solution that represents the algorithm for finding the mean. Stack the blocks in one pile, then divide into the number of equal groups you asked the class to make. This leads to the generalization that the mean is found by dividing the sum by the number of elements.

- Introduce the concept of median as another statistical way to find an average. Explain the process of finding the median: rank order a series of numbers, then find the number in the middle. If there is an even group of numbers, find the mean of the two numbers in the middle.

- Introduce the concept of mode as another way to express the average. Explain that a number can have no mode, one mode, two modes, and so on.

Practice Activities

- Provide data presented in graph form. Have students analyze the data by finding the mean, median, and mode.

- Let students practice with commercial or teacher-made worksheets for finding mean, median, and mode.

Applications

- Give students their test scores for the semester. Have them computer their average grade based on the test scores.

- Use newspaper reports to compute the average temperature for the month, or the batting averages of major league baseball players.

- Measure and weigh students in class; compute average height and weight.

- Have students make a chart of their heights to the nearest centimeter, then find the median height for the class.

- Provide recent test scores for the whole class. Have students compute the class mean, median, and mode for the test scores.

- Find the average class attendance figure for several consecutive weeks.

GRAPHS

Graphs can be used to simpify masses of figures, statments, and calculations. They are an efficient storehouse for details that may be difficult to explain in words.

Graphs have two major purposes. They can clarify data that have already been collected; and they can reveal relationships that were previously hidden. Creating a graph is one part of a process that begins with a problem and ends with conclusions.

Developmental Activities

- o Write the question, "Have you ever made a graph before?" on the chalkboard. Ask students to fill in their names and write yes or no. Demonstrate how this information can be made into a graph.

- o Ask students about any aspect of their lives, For instance, ask, "How many people in the class have dogs or cats? Take a count, collect the information, then turn it into a graph. Surveys of birth dates, the kinds of shoes students are wearing, what they have for breakfast, can all be investigated and graphed.

- o Once data is in graph form, ask questions that can be answered by reading the graphs. Students may need help interpreting graph information at first.

Practice Activities

- o Do a traffic survey. Let students define their own categories of traffic, choose how they will keep a tally, and decide how they will record the data.

- o Ask students to find and bring in examples of graphs in newspapers and magazines.

- o Make a bulletin board display using the graphs students have found.

- o Have students locate their favorite TV programs in newspaper television listings.

- o Help students take a class census and record the data.

- o Have students graph information about special days. For instance, "Did your family have turkey, ham, or something else for Thanksgiving dinner?

Applications

Ask students to graph the following:

Days of the week	Number of students present
Types of Pets	Number in class owning each type
Shoe size	Number in class with each size
Months of the year	Number of class birthdays each month
Bedtimes	Number of children for each time
Weight	Numbers of students for each weight category
Dates	Outdoor and indoor temperatures
Favorite TV Shows	Number of fans for each one
How they spend Saturdays	Number of student hours per activity

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PROBLEM SOLVING

UNDERSTANDING THE PROBLEM

- What is the unknown? What are the data? What is the condition?
- It is possible to satisfy the condition? Is the condition sufficient to determine the unknown? Is it insufficient? Or redundant? Or contradictory?
- Draw a figure. Introduce suitable notation.
- Separate the various parts of the condition. Can you write them down?

FINDING THE CONNECTION BETWEEN THE DATA AND THE UNKNOWN

- You may be obliged to consider auxiliary problems if an immediate connection cannot be found.
- You should eventually obtain a plan for the solution.

DEVISING A PLAN

- Have you seen this problem before? Or have you seen the same problem in a slightly different form?
- Do you know a related problem? Do you know a theorem that could be useful?
- Look at the unknown! Try to think of a familiar problem having the same or a similar unknown.
- Here is a problem related to yours that has been solved before. Can you use it? Can you use its result? Can you use its method? Should you introduce some auxiliary element that will make its use possible?
- Can you restate the problem? Can you restate it still differently? Go back to definitions.
- If you cannot solve the proposed problem try to solve a related problem first. Can you imagine a more accessible related problem? A more general problem? A more special problem? An analogous problem? Could you solve part of the problem?
- Keep only a part of the condition and drop the other part. How far is the unknown then determined; how can it vary? Can you derive something useful from the data? Can you think of other data that will help determine the unknown? Can you change the unknown or the data, or both if necessary, so that the new unknown and the new data are nearer to each other?

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- Did you use all the data? Did you use the whole condition? Have you taken into account all essential notions involved in the problem?

CARRYING OUT THE PLAN

- Carry out your plan of the solution, checking each step.
- Can you see clearly that each step is correct? Can you prove that it is correct?

LOOKING BACK

- Can you check the result? Can you check the argument?
- Can you derive the result differently? Can you see it at a glance?
- Can you use the result, or the method, for some other problem?

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LEVELS OF INSTRUCTION

The mathematics objectives are divided into eight instructional levels, each designed to provide one year of classroom work. Each level includes several basic units of instruction. Although no fixed hierarchy governs the many skills and concepts to be learned in elementary mathematics, the objectives are arranged in a sequence that seems most likely to encourage learning.

KDES YEARLY PROGRESS CHART
MATHEMATICS

Student_____ School Year_____

KEY: |__| not taught
|__| partially learned
|__| learned

Department_____

Teacher_____

LEVEL I

Unit I (Numbers to 5)

SNN 1.01 |__| Count by ones from 1 to 5.

SNN 1.02 |__| Recognize the numbers from 1 to 5.

SNN 1.03 |__| Write the numbers from 1 to 5.

SNN 1.04 |__| Order the numbers from 1 to 5.

RSG 1.01 |__| Determine the group with more and with less, using up to five objects.

Unit II (Numbers to 10)

SNN 1.05 |__| Count by ones from 1 to 10.

SNN 1.06 |__| Recognize the numerals 1 to 10.

SNN 1.07 |__| Write the numerals 1 to 10.

SNN 1.08 |__| Order numbers 1 to 10.

SNN 1.09 |__| Associate numerals up to 10 with their printed word names.

RSG 1.02 |__| Determine the group with more and with less, using up to 10 objects.

RSG 1.03 |__| Interpret a picture graph with up to 10 objects.

Unit III (Addition & Subtraction)

OP 1.01 |__| Recognize plus (+) as the symbol for addition.

OP 1.02 |__| Give sums to 10 for basic addition facts.

OP 1.03 |__| Recognize minus (-) as the symbol for subtraction.

OP 1.04 |__| Give differences for subtraction facts up to 10.

OP 1.05 |__| Complete related addition and subtraction facts.

PS 1.01 |__| Choose the correct addition or subtraction sentence to match a picture.

Unit IV (Numbers to 20)

SNN 1.10 |__| Recognize and write numbers from 10 to 20.

SNN 1.11 |__| Rename numbers from 10 to 20 as tens and ones.

SNN 1.12 |__| Tell the value of pennies and dimes up to 20 cents.

SNN 1.13 |__| Write the numbers from 1 to 20 in order.

RSG 1.04 |__| Compare numbers less than 20.

Unit V (Geometry and Measurement)

GEO 1.01 |__| Identify circle, triangle, rectangle, and square.

MEAS 1.01 |__| Use non-standard units to measure lengths.

MEAS 1.02 |__| Use centimeters rulers to measure lengths.

MEAS 1.03 |__| Use an inch ruler to measure length.

MEAS 1.04 |__| Tell time to the hour.

Unit VI (Numbers to 100)

SNN 1.14 |__| Count by tens to 100.

SNN 1.15 |__| Write numbers from 1 to 100.

MEAS 1.05 |__| Tell the value of a group of dimes to $ 1.00.

Unit VII (Two-Place Addition & Subtraction)

OP 1.06 |__| Add multiples of ten.

OP 1.07 |__| Add two-digit numbers without regrouping.

OP 1.08 |__| Subtract multiples of ten.

OP 1.09 |__| Subtract two two-digit numbers without regrouping.

Unit VIII (Fractions and Measurement)

GEO 1.02 |__| Identify shapes that are symmetrical.

SNN 1.16 |__| Identify shapes that are divided into 1/2, 1/3, and 1/4.

MEAS 1.06 |__| Tell the value of a group of coins up to $1.00 using dimes and pennies.

KDES YEARLY PROGRESS CHART
MATHEMATICS

Student_____ School Year_____

KEY: not taught
partially learned
learned

Department_____

Teacher_____

LEVEL II

Unit I (Numbers to 20)

SNN 2.17 |__| Count by ones from 1 to 20.

SNN 2.18 |__| Recognize the word names for the numerals 1 to 20.

SNN 2.19 |__| Order the numbers from 1 to 20 on a number line.

SNN 2.20 |__| Write the numbers that come before and after numbers up to 20.

SNN 2.21 |__| Use ordinal numbers first through tenth to describe a position.

RSG 2.05 |__| Interpret information on a bar graph.

Unit II (Numbers to 99)

SNN 2.22 |__| Write the standard form for numbers less than 100.

SNN 2.23 |__| Write expanded notation for a two-digit number.

SNN 2.24 |__| Identify the value of each digit in a two-digit number.

SNN 2.25 |__| Recognize the value of dimes and pennies to 99 cents.

OP 2.10 |__| Add two two-digit numbers without regrouping.

OP 2.11 |__| Subtract two two-digit numbers without regrouping.

OP 2.12 |__| Memorize basic addition facts with sums to 18.

Unit III (Counting & Money)

SNN 2.26 |__| Count by twos, fives, and tens to 100.

MEAS 2.07 |__| Determine the value of a group of coins up to $1.00, using pennies, nickels and dimes.

RSG 2.06 |__| Compare money amounts up to $1.00.

OP 2.13 |__| Add money amounts up to $1.00, without regrouping.

OP 2.14 |__| Subtract money amounts up to $1.00 without regrouping.

PS 2.02 |__| Solve everyday word problems involving money amounts up to $1.00.

Unit IV (Measurement)

MEAS 2.08 |__| Identify days of the week

MEAS 2.09 |__| Identify months of the year.

MEAS 2.10 |__| Find specific information using the calendar.

MEAS 2.11 |__| Tell time to the hour and half-hour.

MEAS 2.12 |__| Measure length in terms of centimeters.

MEAS 2.13 |__| Measure length in terms of inches.

Unit V (Addition and Subtraction)

OP 2.15 |__| Group a sum into tens and ones.

OP 2.16 |__| Add two two-digit numbers, regrouping ones.

OP 2.17 |__| Add a two-digit and a one-digit number, regrouping ones.

OP 2.18 |__| Regroup a multiple of ten into tens and ones.

OP 2.19 |__| Subtract a two-digit number from a two-digit multiple of ten.

OP 2.20 |__| Regroup a two-digit number into tens and ones.

OP 2.21 |__| Subtract two two-digit numbers, regrouping tens.

PS 2.03 |__| Solve word problems involving addition and subtraction of two-digit numbers.

RSG 2.07 |__| Interpret a bar graph.

RSG 2.08 |__| Construct a bar graph.

Unit VI (Numbers to 1000)

SNN 2.27 |__| Write the standard number for a given hundred.

SNN 2.28 |__| Count by hundreds to 1000.

SNN 2.29 |__| Write the hundreds in order to 1000.

SNN 2.30 |__| Write the standards for numbers less than 1000.

SNN 2.31 |__| Order numbers less than 1000.

RSG 2.09 |__| Compare numbers less than 1000 using <, >, or =.

GEO 2.03 |__| Construct a representation for a circle, square, triangle, and rectangle.

GEO 2.04 |__| Identify a line of symmetry.

SNN 2.32 |__| Identify 1/2, 1/3, 1/4, 2/3, 3/4, and 1/10.

Unit VI (Addition & Subtraction)

OP 2.22 |__| Add two three-digit numbers without regrouping.

OP 2.23 |__| Subtract two three-digit numbers without regrouping.

PS 2.04 |__| Find sums using picture/word problems.

PS 2.05 |__| Find differences using picture/word problems.

Unit VII (Beginning Multiplication)

OP 2.24 |__| Recognize multiplication as repeated addition

OP 2.25 |__| Recognize times (x) as a symbol for multiplication.

OP 2.26 |__| Write a multiplication fact for a repeated addition sequence.

OP 2.27 |__| Find products involving factors of five or less.

PS 2.06 |__| Find products using picture/word problems.

KDES YEARLY PROGRESS CHART
MATHEMATICS

Student_____ School Year_____

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|__| partially learned
|__| learned

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LEVEL III

Unit I (Numbers to 999)

SNN 3.33 |__| Write the standard form for hundreds, tens, and ones.

MEAS 3.14 |__| Write the value of money, using the cent sign and dollar sign with point.

SNN 3.34 |__| Tell the value of each digit in a three-digit number.

SNN 3.35 |__| Write expanded notation for a three-digit number.

SNN 3.36 |__| Read and write the ordinals from first to thirty-first.

SNN 3.37 |__| Convert numbers up to 12 from Arabic to Roman numerals and vice-versa.

Unit II (Tables and Graphs)

RSG 3.10 |__| Interpret data using a table.

RSG 3.11 |__| Interpret data from a bar graph.

RSG 3.12 |__| Locate points on a grid.

RSG 3.13 |__| Name ordered pairs for points on a grid.

Unit III (addition and subtraction)

OP 3.28 |__| Add two three-digit numbers, regrouping ones.

OP 3.29 |__| Add two three-digit numbers, regrouping tens and ones.

RSG 3.14 |__| Compare two three-digit numbers using <, >, and =.

OP 3.30 |__| Subtract two three-digit numbers with regrouping.

OP 3.31 |__| Use the inverse operation to check addition and subtraction.

PS 3.07 |__| Solve addition and subtraction word problems involving one or two steps.

Unit IV (multiplication & division)

OP 3.32 |__| Multiply two whole numbers using basic facts in both horizontal and vertical forms.

OP 3.33 |__| Develop division facts using repeated subtraction.

OP 3.34 |__| Develop division facts using arrays.

OP 3.35 |__| Write related multiplication and division facts.

PS 3.08 |__| Write a division problem from a pictured situation.

Unit V (measurement)

MEAS 3.15 |__| Read a digital clock or watch printout.

MEAS 3.16 |__| Determine the appropriate metric unit for measuring length using centimeters, meters, kilometers.

MEAS 3.17 |__| Determine the appropriate metric unit for measuring mass using grams and kilograms.

MEAS 3.18 |__| Determine the appropriate metric unit for measuring volume using liters and millileters.

MEAS 3.19 |__| Identify freezing and boiling points of water on a celsuis scale.

MEAS 3.20 |__| Identify freezing and boiling points of water on a fahrenheit scale.

MEAS 3.21 |__| Read and record temperatures from celsuis and Fahrenheit thermometers.

Unit VI (multiplication & division)

OP 3.36 |__| Multiply a two-digit multiple of 10 by a one-digit number.

OP 3.37 |__| Divide a two-digit multiple of ten by a one-digit number.

OP 3.38 |__| Multiply a two-digit by a one-digit number with regrouping.

OP 3.39 |__| Divide a two-digit by a one-digit number.

PS 3.09 |__| Solve word problems using multiplication and division.

Unit VII (fractions)

SNN 3.40 |__| Identify the numerator and denominator of a fractional number.

RSG 3.15 |__| Compare two fractions with the same denominator.

SNN 3.39 |__| Write equivalent fractions.

SNN 3.40 |__| Write a mixed number for the shaded part of a region.

OP 3.40 |__| Find the fractional part of a whole number.

SNN 3.41 |__| Write the decimal equivalent of a common fraction with a denominator of 10 (e.g., 2/10 = .2).

OP 3.41 |__| Add money amounts using dollar signs and points.

OP 3.42 |__| Subtract money amounts using dollar signs and points.

RSG 3.16 |__| Read and interpret a circle graph.

Unit VIII (geometry)

GEO 3.05 |__| Identify cube, cylinder, cone, sphere and pyramid.

GEO 3.06 |__| Find the perimeter of a shape.

GEO 3.07 |__| Find the area of a shape by counting square units.

GEO 3.08 |__| Find the volume of a shape by counting the cubic units that will fit inside.

KDES YEARLY PROGRESS CHART
MATHEMATICS

Student_____ School Year_____

KEY: |__| not taught
|__| partially learned
|__| learned

Department_____

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LEVEL IV

Unit I (Numbers to 9999)

SNN 4.42 |__| Read standard numbers through 9999.

SNN 4.43 |__| Write standard numbers through 9999.

RSG 4.17 |__| Compare numbers less than 9999.

SNN 4.44 |__| Tell the value of each digit in a four-digit number.

SNN 4.45 |__| Write expanded notation for a four-digit number.

SNN 4.46 |__| Round a number to the nearest ten.

SNN 4.47 |__| Round a number to the nearest hundred.

MEAS 4.21 |__| Round money amounts to the nearest dollar.

SNN 4.48 |__| Read and write Roman numerals up to 500.

UNIT II (addition & subtraction)

OP 4.43 |__| Add three three-digit numbers.

OP 4.44 |__| Add two four-digit numbers.

OP 4.45 |__| Subtract two four-digit numbers.

OP 4.46 |__| Estimate solutions to problems by rounding in addition.

OP 4.47 |__| Estimate solution to problems in subtraction by rounding.

MEAS.4.22 |__| Find the value of money amounts up to $10.00.

MEAS 4.23 |__| Make change for money amounts up to $10.00.

RSG 4.18 |__| Interpret information from a table.

Unit III (multiplication)

OP 4.48 |__| Use numbers 1- 9 as factors.

SNN 4.49 |__| Write multiples of numbers from 1 to 9.

OP 4.49 |__| Check multiplication by using the inverse operation.

OP 4.50 |__| Multiply a two or three-digit number by a one-digit number.

OP 4.51 |__| Estimate the product of two numbers.

OP 4.52 |__| Multiply money amounts using money notation.

PS 4.10 |__| Solve word problems using information from a bar graph.

Unit IV (measurement)

MEAS 4.24 |__| Determine the appropriate metric unit for liquid measures using liters and milliliters.

MEAS 4.25 |__| Make conversions among cups, pints, quarts, and gallons.

MEAS 4.26 |__| Measure time in terms of minutes and seconds.

PS 4.11 |__| Solve word problems involving time.

PS 4.12 |__| Solve word problems involving money.

Unit V (division)

SNN 4.50 |__| Use numbers 1 through 9 as divisors and quotients.

OP 4.53 |__| List factors of numbers less than 20.

OP 4.54 |__| Divide a two-digit by a one-digit number.

OP 4.55 |__| Divide a two- or three-digit number by a multiple of 10.

OP 4.56 |__| Divide a two-digit by a one-digit number (2 steps).

Unit VI (fractions)

SNN 4.51 |__| Write fractions to name points on a number line.

SNN 4.52 |__| Write a fraction to describe part of a unit of measure.

OP 4.57 |__| Write a fraction in its simplest form.

OP 4.58 |__| Add fractions with like denominators.

OP 4.59 |__| Subtract fractions with like denominators.

OP 4.60 |__| Write a fraction as a mixed number.

OP 4.61 |__| Write a decimal for a mixed number using tenths.

OP 4.62 |__| Add decimals using tenths and hundredths.

OP 4.63 Subtract decimals using tenths and hundredths.

Unit VII (geometry)

GEO 4.09 |__| Identify points, lines, rays, and angles.

GEO 4.10 |__| Identify a right angle.

GEO 4.11 |__| Identify parallel lines.

GEO 4.12 |__| Identify perpendicular lines.

GEO 4.13 |__| Identify quadrilateral, pentagon, hexagon, and octagon.

KDES YEARLY PROGRESS CHART
MATHEMATICS

Student_____ School Year_____

KEY: |__| not taught
|__| partially learned
|__| learned

Department_____

Teacher_____

LEVEL V

Unit I (Numbers to 1,000,000)

SNN 5.53 |__| Read standard numbers through seven places (1,000,000).

SNN 5.54 |__| Write standard numbers through seven places.

RSG 5.19 |__| Compare numbers less than 1,000,000.

SNN 5.55 |__| Order numbers less than 1,000,000.

SNN 5.56 |__| Tell the value of each digit in a seven-digit number.

SNN 5.57 |__| Write expanded notation for a seven-digit number.

SNN 5.58 |__| Read and write Roman numerals up to 1000.

Unit II (rounding numbers)

SNN 5.59 |__| Round numbers to the nearest ten, hundred, or thousand.

PS 5.13 |__| Solve word problems involving rounding.

OP 5.64 |__| Estimate sums by rounding to the nearest ten, hundred, thousand.

OP 5.65 |__| Estimate differences by rounding to the nearest ten, hundred, or thousand.

Unit III (multiplication & division)

OP 5.66 |__| Multiply a two-digit number by a multiple of 10 or 100.

OP 5.67 |__| Multiply two two-digit numbers.

OP 5.68 |__| Divide a two-digit number by a multiple of 10 or 100.

OP 5.69 |__| Divide a two or three-digit number by a multiple of of 10.

OP 5.70 |__| Divide a three- or four-digit number by a multiple of 10.

PS 5.14 |__| Multiply or divide to solve word problems.

Unit IV (decimals)

SNN 5.60 |__| Read and write decimals to thousandths.

SNN 5.61 |__| Give the place of any digit in a decimal through thousandths.

RSG 5.20 |__| Compare decimals through thousandths using <, >, and =.

SNN 5.62 |__| Order decimals.

SNN 5.63 |__| Round decimals through the nearest whole number.

SNN 5.64 |__| Round decimals to the nearest tenths.

SNN 5.65 |__| Round money amounts to the nearest dollar.

OP 5.71 |__| Add two or more decimals through thousandths.

OP 5.72 |__| Subtract two decimals through thousandths.

PS 5.15 |__| Solve word problems involving money.

Unit V (fractions)

SNN 5.66 |__| Find the greatest common factor of two numbers.

SNN 5.67 |__| Find the least common multiple of two numbers.

SNN 5.68 |__| Find the common denominator for two fractions.

RSG 5.21 |__| Compare fractions with unlike denominators.

OP 5.73 |__| Add fractions with unlike denominators.

OP 5.74 |__| Add mixed numbers with like denominators.

OP 5.75 |__| Add mixed numbers with unlike denominators.

PS 5.16 |__| Solve problems using information from a circle graph.

Unit VI (fractions, subtraction)

OP 5.76 |__| Subtract fractions with unlike denominators (no regrouping).

OP 5.77 |__| Subtract a fraction from a whole number.

OP 5.78 |__| Subtract mixed numbers with like denominators.

OP 5.79 |__| Subtract a mixed number from a whole number.

OP 5.80 |__| Subtract two mixed numbers with unlike denominators (no regrouping).

Unit VII (statistics)

RSG 5.22 |__| Find the range of a group of numbers.

RSG 5.23 |__| Find the mean (average) of a group of numbers.

RSG 5.24 |__| Find the median of a group of numbers.

RSG 5.25 |__| Interpret information on a double bar graph.

Unit VIII (fractions and decimals)

OP 5.81 |__| Multiply a whole number by a fraction.

OP 5.82 |__| Multiply two fractions.

OP 5.83 |__| Multiply a fraction by a mixed number.

OP 5.84 |__| Multiply a decimal and a whole number.

OP 5.85 |__| Multiply two decimals

OP 5.86 |__| Write a fraction as a percent or a percent as a fraction.

OP 5.87 |__| Write a decimal as a percent or a percent as a decimal.

Unit IX (geometry)

GEO 5.14 |__| Identify congruent shapes.

GEO 5.15 |__| Identify similar shapes.

GEO 5.16 |__| Identify right angles, acute angles, and obtuse angles.

GEO 5.17 |__| Measure angles using a protractor.

GEO 5.18 |__| Find the area of a rectangle using a formula.

GEO 5.19 |__| Find the volume of a box using a formula.

GEO 5.20 |__| Interpert a scale drawing.

Unit X (measurement)

MEAS 5.27 |__| Choose and measure lengths using centimeters and meters.

MEAS 5.28 |__| Choose and measure weights using grams and kilograms.

MEAS 5.29 |__| Estimate temperatures in degrees celsuis.

MEAS 5.30 |__| Estimate temperatures in degrees farhenheit.

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|__| learned

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LEVEL VI

Unit I (Numbers to billions)

SNN 6.69 |__| Read standard numbers through 10 places (billions).

SNN 6.70 |__| Write standard numbers through 10 places.

RSG 6.26 |__| Compare numbers less than 1,000,000,000.

SNN 6.71 |__| Order numbers less than 1 billion from least to greatest.

SNN 6.72 |__| Tell the value of each digit in a 10-digit number.

SNN 6.73 |__| Write expanded notation for a 10-digit number or less.

Unit II (rounding numbers)

SNN 6.74 |__| Round numbers to the nearest tens, hundreds, thousands, or millions.

OP 6.88 |__| Solve problems that involve rounding in addition, subtraction, multiplication, and division.

SNN 6.75 |__| Round money amounts to the nearest hundred dollars.

OP 6.89 |__| Solve missing addend equations.

Unit III (multiplication)

OP 6.90 |__| Multiply three numbers.

OP 6.91 |__| Apply the associative property of multiplication.

OP 6.92 |__| Solve equations with missing factors.

OP 6.93 |__| Estimate products using rounded numbers.

OP 6.94 |__| Change a number from exponential form to standard form.

OP 6.95 |__| Write a standard number in exponential form.

Unit IV (factors & multiples)

SNN 6.76 |__| Find the common factor or greatest common factor of two or more numbers.

SNN 6.77 |__| Identify and list prime and composite numbers.

SNN 6.78 |__| Identify and list the prime factorization of a number.

SNN 6.79 |__| Find the common multiple and least common multiple of two or more numbers.

PS 6.17 |__| Solve word problems using common multiples.

Unit V (division)

OP 6.96 |__| Divide a three- or four-digit number by a two-digit number (two-step division).

OP 6.97 |__| Divide a four- or five-digit number by a two-digit number (three-step division).

PS 6.18 |__| Solve word problems using whole number division.

Unit VI (decimals)

SNN 6.80 |__| Read and write decimals through millionths.

SNN 6.81 |__| Give place value of any digit in a decimal through thousandths.

OP 6.98 |__| Write equal decimals.

RSG 6.27 |__| Compare decimals through millionths.

SNN 6.82 |__| Order decimals through millionths.

SNN 6.83 |__| Round decimals to the nearest tenth, hundredth, or thousandth.

OP 6.99 |__| Estimate sums of decimals using rounded numbers.

OP 6.100 |__| Estimate differences of decimals using rounded numbers.

PS 6.19 |__| Solve word problems involving decimals.

Unit VII (measurement)

MEAS 6.31 |__| Choose an appropriate metric measure of length, capacity, or mass (weight).

MEAS 6.32 |__| Given a metric measure of length, capacity, or mass, find an equal measure using a smaller or larger metric unit.

MEAS 6.33 |__| Read a thermometer and choose an appropriate temperature in degrees celsuis.

MEAS 6.34 |__| Given the time in one time zone, find the time in another zone.

PS 6.20 |__| Solve word problems involving metric units.

Unit VII (geometry)

GEO 6.21 |__| Find the area of a rectangle using a formula.

GEO 6.22 |__| Find the area of a triangle using a formula.

GEO 6.23 |__| Find the area of a circle using a formula.

GEO 6.24 |__| Find the volume of a cylinder.

GEO 6.25 |__| Use scale drawings to find actual lengths.

PS 6.21 |__| Solve word problems using scale drawing.

UNIT VIII (multiplying fractions & decimals)

OP 6.101 |__| Multiply a whole number and a fraction.

OP 6.102 |__| Multiply two fractions.

OP 6.103 |__| Multiply a fraction and a mixed number.

OP 6.104 |__| Multiply two mixed numbers.

OP 6.105 |__| Multiply a decimal by 10, 100, or 1000.

OP 6.106 |__| Multiply a decimal by a whole number.

OP 6.107 |__| Multiply two decimals.

UNIT IX (dividing fractions & decimals)

OP 6.108 |__| Divide a fraction by a whole number.

OP 6.109 |__| Divide a fraction by a fraction.

OP 6.110 |__| Divide a fraction by a mixed number.

OP 6.111 |__| Divide a mixed number by a mixed number.

OP 6.112 |__| Divide a decimal by a whole number.

OP 6.113 |__| Divide a decimal by a decimal.

SNN 6.84 |__| Round a quotient to the nearest tenth, hundredth, or thousandth.

UNIT X (ratios and proportions)

RSG 6.28 |__| Express a ratio in three ways: 2 to 5, 2 : 5, and 2/5.

RSG 6.29 |__| Solve a proportion by using equal fractions.

RSG 6.30 |__| Solve a proportion by cross multiplying.

RSG 6.31 |__| Decide if two ratios are equal by using cross products.

PS 6.22 |__| Solve word problems using equal ratios.

PS 6.23 |__| Use proportions to solve problems involving similar figures or scale drawings.

RSG 6.32 |__| Use proportions to estimate distances on a map.

Unit XI (fractions--addition & subtraction)

OP 6.114 |__| Add fractions with unlike denominators (regrouping).

OP 6.115 |__| Add mixed numbers with unlike denominators (regrouping).

OP 6.116 |__| Subtract fractions with unlike denominators (regrouping).

OP 6.117 |__| Subtract mixed numbers with unlike denominators (regrouping).

Unit XII (percent)

OP 6.118 |__| Write a percent as a fraction in lowest terms.

OP 6.119 |__| Find the percent of a number by using equal fractions.

OP 6.120 |__| Find the percent of a number by using equal decimals.

PS 6.24 |__| Solve word problems that involve interest.

PS 6.25 |__| Solve word problems that involve sales tax.

RSG 6.33 |__| Use circle graphs to show percents.

UNIT XIII (integers + & -)

SNN 6.85 |__| Identify positive and negative numbers as points on a number line.

SNN 6.86 |__| Order integers.

SNN 6.87 |__| Identify positive and negative numbers as opposites.

RSG 6.34 |__| Locate a point on a grid for an ordered pair of integers.

RSG 6.35 |__| Give an ordered pair of integers for points on a grid.

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LEVEL VII

Unit I (Numbers to trillions)

SNN 7.88 |__| Read standard numbers through 15 places.

SNN 7.89 |__| Write standard numbers through 15 places.

SNN 7.90 |__| Compare and order numbers less than trillions.

SNN 7.91 |__| Tell the value of each digit in a 15-digit number or less.

SNN 7.92 |__| Write expanded notation for a 15-digit number or less.

SNN 7.93 |__| Round numbers to the nearest ten, hundred, thousand, million, or billion.

PS 7.26 |__| Solve problems that involve rounding in addition, subtraction, multiplication, and division.

OP 7.121 |__| Evaluate expressions involving addition and subtraction.

OP 7.122 |__| Write expressions for word phrases involving addition and subtraction.

Unit II (number properties)

OP 7.123 |__| Compute using the rules for order of operations involving addition, subtraction, multiplication, and division.

OP 7.124 |__| Compute using the commutative property of addition and multiplication.

OP 7.125 |__| Compute using the associative property of addition and multiplication.

OP 7.126 |__| Compute using the addition property of zero.

OP 7.127 |__| Compute using the multiplication property of one.

OP 7.128 |__| Compute using the the distributive property of multiplication over addition.

Unit III (decimals)

SNN 7.94 |__| Read and write decimals through millionths.

SNN 7.95 |__| Give the place value of any digit in a decimal through hundred thousandths.

OP 7.129 |__| Write equal decimals.

RSG 7.36 |__| Compare decimals through millionth period.

SNN 7.96 |__| Order decimals through thousandth period.

SNN 7.97 |__| Round decimals to nearest tenth, hundredth, or thousandth.

OP 7.130 |__| Estimate sums of decimals using rounded numbers.

OP 7.131 |__| Estimate differences of decimals using rounded numbers.

OP 7.132 |__| Add two or more decimals through ten thousandths.

OP 7.133 |__| Subtract decimals through ten thousandths.

PS 7.27 |__| Solve word problems involving addition of decimals.

PS 7.28 |__| Solve word problems involving subtraction of decimals.

OP 7.134 |__| Multiply decimals with two or more places.

OP 7.135 |__| Estimate products of decimals using rounded numbers.

OP 7.136 |__| Divide decimals by whole numbers.

SNN 7.98 |__| Round a quotient to the nearest tenth, hundredth, or thousandth.

Unit IV (number properties)

OP 7.137 |__| Identify numbers that are divisible by 2, 3, 5, 9, or 10.

OP 7.138 |__| Identify and list prime and composite numbers.

OP 7.139 |__| Identify and list the prime factorization of a number.

SNN 7.99 |__| Find the least common multiple of a number.

OP 7.140 |__| Divide two whole numbers and give quotient as a mixed number.

OP 7.141 |__| Write a fraction as a decimal and a decimal as a fraction.

OP 7.142 |__| Write a fraction as a repeating or terminating decimal.

OP 7.143 |__| Solve division and multiplication equations using decimals.

PS 7.29 |__| Solve word problems involving decimals.

Unit V (metric measurement)

MEAS 7.35 |__| Choose an appropriate metric measure of length, and estimate the length of an object.

MEAS 7.36 |__| Estimate an measure lengths to the nearest centimeter or millimeter.

MEAS 7.37 |__| Find equal measures of lengths using smaller or larger metric units.

MEAS 7.38 |__| Choose an appropriate metric measure of capacity and estimate the capacity of an object.

MEAS 7.39 |__| Find equal measures of capacity using smaller or larger metric units.

MEAS 7.40 |__| Choose an appropriate metric measure of mass of an object and estimate the mass of an object.

MEAS 7.41 |__| Find equal measures of mass using smaller or larger metric units.

MEAS 7.42 |__| Choose the appropriate celsius temperature for a given situation.

Unit VI (proportions)

RSG 7.37 |__| Use proportions to find dimensions in similar pologons.

RSG 7.38 |__| Use proportions to compare prices.

RSG 7.39 |__| Use proportions to find dimensions on a scale drawing.

RSG 7.40 |__| Use proportions to find distances on a map.

PS 7.30 |__| Write a proportion for data presented in a word problem and solve the problem.

Unit VII (percents)

OP 7.144 |__| Write a decimal as a percent or a percent as a decimal.

OP 7.145 |__| Find what percent one number is of another.

OP 7.146 |__| Find a number when a percent of it is known.

PS 7.31 |__| Solve word problems that involve interest.

PS 7.32 |__| Solve word problems that involve sales tax.

PS 7.33 |__| Solve word problems that involve discounts.

Unit VIII (geometry)

GEO 7.26 |__| Identify congruent segments and congruent angles.

GEO 7.27 |__| Use a compass and a straightedge to bisect a segment.

GEO 7.28 |__| Use a compass and a straightedge to construct a triangle given the lengths of its sides.

GEO 7.29 |__| Identify equuilateral, isosceles, scalene, right, acute, and obtuse triangles.

GEO 7.30 |__| Find a missing angle measure in a triangle.

GEO 7.31 |__| Find the area of a parallelogram.

GEO 7.32 |__| Find the area of a triangle.

GEO 7.33 |__| Identify the radius, diameter, chord, arc, and central angle of a circle.

GEO 7.34 |__| Find the circumference and area of a circle.

GEO 7.35 |__| Give the number of faces, edges, and vertices of a polygon.

GEO 7.36 |__| Identify regular polyhedrons.

GEO 7.37 |__| Give the numbers and shapes of the faces of a regular polyhedron.

GEO 7.38 |__| Find surface area of a rectangle or triangular prism.

GEO 7.39 |__| Find the volume of a cylinder.

Unit VIII (statistics)

RSG 7.41 |__| Organize statistical data.

RSG 7.42 |__| Find the mean for a set of data.

RSG 7.43 |__| Find the median and mode for a set of data.

PS 7.34 |__| Solve problems involving mean, median, and mode.

RSG 7.44 |__| Read a broken-line graph.

RSG 7.45 |__| Read and interpret a circle graph.

Unit IX (probability)

RSG 7.46 |__| Find probability of simple situations when outcomes are equally likely.

RSG 7.47 |__| Write probabilities using a list or tree diagram.

RSG 7.48 |__| Find the number of possibles outcome using multiplication.

RSG 7.49 |__| Estimate probabilities when outcomes are not equally likely.

Unit X (integers)

SNN 7.100 |__| Compare and order integers.

OP 7.147 |__| Add postive and negative integers.

OP 7.148 |__| Subtract negative and postive integers.

OP 7.149 |__| Multiply postive and negative integers.

OP 7.150 |__| Divide positive and negative integers.

RSG 7.50 |__| Locate a point on a grid for an ordered pair of integers, and give an ordered pair of integers a point on a grid.

OP 7.151 |__| Compute with integers using the rules for order of operations.

OP 7.152 |__| Evaluate expressions involving adding and subtracting integers.

OP 7.153 |__| Write addition and subtraction equations involving integers.

OP 7.154 |__| Evaluate expressions involving multiplication and division.

OP 7.155 |__| Write multiplication and division equations involving integers.

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LEVEL VIII

Unit I (Numeration)

SNN 8.101 |__| Change a number from exponential form to standard form.

SNN 8.102 |__| Write a standard number in exponential form.

SNN 8.103 |__| Round whole numbers.

OP 8.156 |__| Estimate sums, differences, products and quotients using rounded numbers.

OP 8.157 |__| Compute, using the rules for order of operations when addition, subtraction, multiplication, and division are involved.

Unit II (decimal place value)

SNN 8.104 |__| Give the value of any digit in a decimal number.

SNN 8.105 |__| Round a decimal to the nearest whole number, tenth, hundredth, thousandth, or ten-thousandth place.

RSG 8.51 |__| Compare decimals.

SNN 8.106 |__| Order decimals.

Unit III (metric measurement)

MEAS 8.43 |__| Find equal measures of length, using smaller or larger metric units.

MEAS 8.44 |__| Find equal measures of mass, using smaller or larger metric units.

MEAS 8.45 |__| Find equal measures of capacity, using smaller and larger units of measure.

Unit IV (decimals)

OP 8.158 |__| Estimate sums of decimals by rounding.

OP 8.159 |__| Estimate differences of decimals by rounding.

OP 8.160 |__| Add decimal numbers up to four places.

OP 8.161 |__| Subtract decimal numbers up to four places.

OP 8.162 |__| Multiply decimal numbers.

OP 8.163 |__| Estimate products of decimals by rounding.

OP 8.164 |__| Divide decimals and round quotients.

PS 8.35 |__| Solve word problems involving decimals.

UNIT IV (number properties)

OP 8.165 |__| Evaluate expressions involving addition, subtraction, multiplication, and division.

OP 8.166 |__| Write expressions for word phrases involving addition, subtraction, multiplication and division.

OP 8.167 |__| Apply the identity element for addition and subtraction.

OP 8.168 |__| Apply the commutative property to addition and multiplication.

OP 8.169 |__| Apply the associative property of addition and multiplication.

OP 8.170 |__| Apply the distributive property of multiplication over addition.

Unit V (number properties)

SNN 8.107 |__| Find the greatest common factor of a number.

SNN 8.108 |__| Identify a number as prime or composite.

SNN 8.109 |__| Write the prime factorization of a number.

SNN 8.110 |__| Find the least commom multiple of a number.

OP 8.171 |__| Identify numbers that are divisible by 2, 3, 5, 9, and 10.

Unit VI (fractions)

SNN 8.111 |__| Write equal fractions and write fractions in lowest terms.

OP 8.172 |__| Write an improper fraction as a mixed number or a whole number.

OP 8.173 |__| Write a mixed number as an improper fraction.

OP 8.174 |__| Write a fraction as a terminating or repeating decimal.

OP 8.175 |__| Write a decimal as a fraction or a mixed number.

OP 8.176 |__| Multiply fraction, decimals, amd whole numbers.

OP 8.177 |__| Find the reciprocal of a fraction, a mixed number, or a whole number.

OP 8.178 |__| Divide fractions, mixed numbers, and whole numbers.

PS 8.36 |__| Solve word problems involving multiplication or division of fractions.

Unit VII (fractions—addition & subtraction)

OP 8.179 |__| Find a common denominator for two or more fractions.

OP 8.180 |__| Compare and order fractions and mixed numbers.

OP 8.181 |__| Add and subtract fractions.

OP 8.182 |__| Add and subtract mixed numbers.

PS 8.37 |__| Solve addition and subtract equations involving fractions.

Unit VIII (geometry)

GEO 8.40 |__| Identify points, lines, planes, rays, segments, parallel lines, and perpendicular lines.

GEO 8.41 |__| Measure and draw angles using a protractor.

GEO 8.42 |__| Classify angles as acute, obtuse, and right.

GEO 8.43 |__| Identify and measure vertical angles and adjacent angles.

GEO 8.44 |__| Find the measure of alternate interior and alternate exterior angles.

GEO 8.45 |__| Find the measure of corresponding angles.

GEO 8.46 |__| Bisect and copy angles.

GEO 8.47 |__| Identify congruent segments, congruent angles, congruent polygons, and corresponding parts of congruent polygons.

GEO 8.48 |__| Classify triangles and polygons.

GEO 8.49 |__| Find the missing angle measure in a triangle.

GEO 8.50 |__| Construct congruent triangles.

GEO 8.51 |__| Identify a chord, diameter, radius, and arc.

Unit IX (geometry)

GEO 8.52 |__| Find the perimeter of a polygon.

GEO 8.53 |__| Find the circumference of a circle.

GEO 8.54 |__| Find the area of a rectangle, square, and parallelogram.

GEO 8.55 |__| Find the area of a triangle and a trapezoid.

GEO 8.56 |__| Find the area of a circle.

GEO 8.57 |__| Find the surface area of a rectangle, prism, pyramid, and cylinder.

GEO 8.58 |__| Find the volume of a pyramid or cylinder.

GEO 8.59 |__| Find the volume of a cylinder and sphere.

PS 8.38 |__| Solve word problems involving geometric applications.

Unit X (percents)

OP 8.183 |__| Write a percent as a decimal or fraction, and write a decimal or fraction as a percent.

OP 8.184 |__| Find the percent of a number.

OP 8.185 |__| Find interest using the formula I = PRT.

OP 8.186 |__| Find what percent one number is of another.

OP 8.187 |__| Find a number when a percent of it is known.

OP 8.188 |__| Find the percent of change between two numbers.

OP 8.196 |__| Multiply and divide integers.

OP 8.197 |__| Locate a point on a grid for an ordered pair of integers.

OP 8.198 |__| Give an ordered pair of integers a point on a grid.

OP 8.199 |__| Graph ordered pairs.

Unit XIV (equations)

OP 8.200 |__| Find the value of an expression.

OP 8.201 |__| Solve addition and subtraction equations involving rational numbers.

OP 8.202 |__| Use reciprocals to solve equations involving rational numbers.

RSG 8.59 |__| Graph the solution of an equation on a number line.

RSG 8.60 |__| Complete ordered pairs for an equation.

Unit XV (geometry & square roots)

OP 8.203 |__| Find the square of a number that is a perfect square.

OP 8.204 |__| Multiply square roots.

OP 8.205 |__| Divide square roots.

OP 8.206 |__| Simplify square roots.

OP 8.207 |__| Find the square root of a number using a table.

GEO 8.60 |__| Construct squares on the side of a right triangle. Then find the area of the squares and tell how they are related.

GEO 8.61 |__| Find the length of the sides of a right triangle, given the length of the other two sides.

PS 8.41 |__| Apply the pythagorean relationship to solve word problems.

GEO 8.62 |__| Write the sine, cosine, and tangent of an angle as a ratio.

GEO 8.63 |__| Find the tangent, sine, and cosine ratio using a table.

GEO 8.64 |__| Find the length of the sides of a triangle, using a trigonometry ratio.

PS 8.39 |__| Solve word problems involving percents.

Unit XI (statistics)

RSG 8.52 |__| Find the mean, median, mode, and range of a set of data.

RSG 8.53 |__| Interpret a bar graph or a double bar graph.

RSG 8.54 |__| Interpret a line graph, broken line graph or double line graph.

RSG 8.55 |__| Make a frequency table for a group of numbers.

RSG 8.56 |__| Interpret a histogram.

RSG 8.57 |__| Interpret a circle graph.

RSG 8.58 |__| Prepare a bar graph, line graph, or circle graph using collected data.

PS 8.40 |__| Solve word problems involving concepts of statistics.

Unit XII (probability)

OP 8.189 |__| Find missing numbers in equal ratio and proportions.

OP 8.190 |__| Find the probability of a favorable outcome if all outcomes are equally likely.

OP 8.191 |__| Predict the number of favorable outcomes by multiplying the probability of a favorable outcome by the total number of trials.

OP 8.192 |__| Find the probability of an outcome that involves two or more independent choices.

OP 8.193 |__| Find the probability of an outcome that involves two or more dependent choices.

Unit XIII (integers)

SNN 8.112 |__| List integers on a number line.

SNN 8.113 |__| Write integers for a given situation.

SNN 8.114 |__| Compare and order integers.

OP 8.194 |__| Add integers.

OP 8.195 |__| Subtract integers.

OP 8.196 |__| Multiply and divide integers.

OP 8.197 |__| Locate a point on a grid for an ordered pair of integers.

OP 8.198 |__| Give an ordered pair of integers a point on a grid.

OP 8.199 |__| Graph ordered pairs.

Unit XIV (equations)

OP 8.200 |__| Find the value of an expression.

OP 8.201 |__| Solve addition and subtraction equations involving rational numbers.

OP 8.202 |__| Use reciprocals to solve equations involving rational numbers.

RSG 8.59 |__| Graph the solution of an equation on a number line.

RSG 8.60 |__| Complete ordered pairs for an equation.

Unit XV (geometry & square roots)

OP 8.203 |__| Find the square of a number that is a perfect square.

OP 8.204 |__| Multiply square roots.

OP 8.205 |__| Divide square roots.

OP 8.206 |__| Simplify square roots.

OP 8.207 |__| Find the square root of a number using a table.

GEO 8.60 |__| Construct squares on the side of a right triangle. Then find the area of the squares and tell how they are related.

GEO 8.61 |__| Find the length of the sides of a right triangle, given the length of the other two sides.

PS 8.41 |__| Apply the pythagorean relationship to solve word problems.

GEO 8.62 |__| Write the sine, cosine, and tangent of an angle as a ratio.

GEO 8.63 |__| Find the tangent, sine, and cosine ratio using a table.

GEO 8.64 |__| Find the length of the sides of a triangle, using a trigonometry ratio.

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APPENDIX A. GLOSSARY

A

Abacus: An ancient counting frame or device consisting of movable beads on parallel rods. Each rod represents a place in a numeral. Empty rods perform the same function as zero, holding a place in a numeral.

Acute angle: An angle measuring less than 90 degrees.

Addends: Numbers that are added to reach a sum.

Adjacent angles: Two angles having the same vertex and one side in common.

Algorithm: A method of writing and performing any of the four basic mathematics operations.

Angle: A geometric figure formed by two lines starting from a common point or vertex.

Approximation: A number that is nearly correct, often arrived at by estimation.

Arc: Part of a circle.

Area: The number of square units needed to measure the space occupied by a plane figure.

Array: An orderly arrangement of the elements of a set in rows, with the same number of elements in each row.

Associative property of addition: A principle stating that the arrangement of addends does not affect the sum. $(7 + 2) + 5 = 7 + (2 + 5)$ (Also known as the commutative property of addition.)

Associative property of multiplication: A principle stating that the arrangement of factors does not affect the product. $(7 \times 2) \times 5 = 7 \times (2 \times 5)$ (Also known as the commutative property of multiplication.)

Attribute blocks: Aids to learning—manipulable sets of circles, triangles, squares, rectangles, and hexagons, in three colors, two sizes, and two thicknesses.

Average: A number reached by dividing the sum of two or more figures by the total number of addends.

Axis: One of two perpendicular number lines that form a coordinate plane.

B

Base system of numeration: The number of digits in a place system; a base 10 system uses the digits 0,1,2,3,4,5,6,7,8,9. The base also controls the number of units in a place system that will equal one unit in the place immediately to the left.

Base 10 blocks: Manipulable models for a base-10 numeration system, consisting of blocks representing tens, hundreds, and thousands.

Base 10 type materials: Manipulable materials used to help students understand the base 10 system: "bean sticks;" sets of pennies, dimes, and dollars, etc.

Base fact: In addition or multiplication, combining two one-digit numbers with their sum or product. Corresponding facts in subtraction or division are reached by the opposite operation, excluding division by 0.

Binary operation: A basic mathematical operation that involves only two numbers.

Bisect: Separate into two equal parts.

C

Cardinal number: Any number that answers the question 'How many?'

Celsius temperature: The metric temperature scale. Water freezes at 0 degrees and boils at 100 degrees Centigrade.

Centi-: The metric prefix that indicates one hundredth (1/100).

Centimeter (cm): The metric unit for 0.01 meter.

Chord: A line with both endpoints on a circle. A diameter is a special kind of chord.

Circle: A plane figure in which all points are the same distance from a given point called the center.

Circle graph: A graph in which sectors of a circle represent parts of a whole.

Circumference: The distance around a circle.

Closure: A set of numbers is closed with respect to an operation if the answer reached by applying that operation is an element in that set.

Cognition: The process of knowing, through perception, introspection, or memory.

Common denominator: A common multiple of two or more denominators. A common denominator for 5/6 and 1/8 is 24.

Common factor: A number that is a factor of two or more numbers.

Common multiple: A number that is a multiple of two or more numbers. A common multiple of 4 and 6 is 12.

Compass: An instrument used to draw circles.

Composite number: A whole number, greater than 0, that has more than two factors.

Concept: An understanding of a basic idea; a mental image of an action or thing.

Cone: A space figure that is circular at one end and reaches a point at the other.

Congruent figures: Two geometric figures that have the same size and shape.

Counting numbers: Whole numbers greater than 0; also called natural numbers or positive integers.

Cross-products: For the ratios 3/4 and 9/12, the cross-products are 3 x 12 and 4 x 9.

Cube: A prism with all square faces.

Cylinder: A space figure, both ends of which are equal circles.

D

Decimal: A fractional number in which the denominator is indicated by the position of the decimal point.

Degree: The unit used to measure angles.

Denominator: The lower numeral in a fraction, which indicates the number of equal parts.

Density property: The fraction between any two fractions on a number line.

Dependent events: Two events in which the second is affected by the result of the first.

Diagnosis: In teaching, a process that helps a teacher identify the step in an operation that causes student mistakes.

Diagnostic testing: Testing to identify where a learner has difficulty with given operations or procedures.

Diameter: A line segment through the center of a circle with both endpoints on the circle. Also, the length of the segment.

Difference: The answer to a subtraction problem. In the problem 15 - 11 = 4, the difference is 4.

Digit: Any numeral from 0 to 9. Digits are the symbols for numbers in the place-value system.

Distributive property: The product of a number and a sum equals the sum of the products: $3 \times (5 + 6) = (3 \times 5) + (3 \times 6)$

Dividend: A number that is divided by another. In the division problem 16 divided by 4, the dividend is 16.

Divisible: One number is divisible by another if, after division, the remainder is zero. Dividing 24 by 8 results in a remainder of zero; therefore 24 is divisible by 8.

Division: A mathematics operation that separates a number into equal parts to find the number of parts, or that distributes parts into equal groups to learn how many groups.

Division property of equality: If each side of an equation is divided by the same number, the new equation has the same result.

Divisor: The number by which a dividend is divided. In the division problem 18 divided by 6, the divisor is 6.

E

Edge: In a space figure, a segment where two faces meet.

Endpoint: The point at the end of a line segment.

Equally likely events: Probability, based on the assumption that any event in a given set is as likely to occur as any other.

Equation: A mathematical sentence that includes an equal (=) sign. $5 \times 4 = 20$.

Equilateral triangle: A regular triangle—one that has three equal or congruent sides.

Equivalent fractions: Equal fractions; two fractions are equal if they name the same number. $1/2 = 3/6$

Error pattern: Student computational errors that follow a consistent pattern.

Even number: A whole number with a factor of 2.

Expanded form: A way of writing a number to show the value of each digit. There are several ways to write the expanded form for 459; for instance:

$459 = 400 + 50 + 9$, or

$459 = (4 \times 100) + (5 \times 10) + (9 \times 1)$.

Exponent: A number that tells how many times the base is used as a factor. In 10^2, the exponent is 2.

x

F

Face: A flat surface that is part of a polyhedron.

Face value: The cardinal value of a digit in a numeral. The face value of 2 in 27 is cardinal value two.

Factor: A number to be multiplied. In 4 x 6 = 24, the factors are 4 and 6.

Factorial: The product of a whole number and every whole number less than itself. 4! = 4 x 3 x 2 x 1 = 24

Fraction: A number such as 3/4. In 3/4, the numerator (3) tells how many equal parts are being considered. The denominator (4) gives the total number of equal parts.

Frequency table: In statistics, a list of the data and of the number of times each data item occured.

G

Geoboard: A pegboard, usually about 10 x 10", with a 5 x 5 set of pegs. Rubber bands may be stretched around the pegs to illustrate geometric shapes and number patterns.

Geometric figure: One or more points in space.

Gram: A metric unit of mass or weight equal to the weight of a cubic centimeter of distilled water at four degrees Centigrade.

Greatest common factor: The largest possible divisor of two or more given numbers.

H

Heuristic: A strategy that may enable students to solve a problem.

Hexagon: A six-sided polygon.

Hypotenuse: In a right triangle, the side opposite the right angle.

I

Identity element for addition: The identity element for addition is 0. Zero added to any number is that same number.

Identity element for multiplication: The identity element for multiplication is 1. Any number multiplied by 1 is that same number.

Improper fraction: A fraction whose numerator is greater than or equal to its denominator.

Inequality A number sentence using two expressions as names for different numbers; for example, $2 + 3 = 5$, or $n - 5 < 2$.

Integer: The integers include the set of positive whole numbers, negative whole numbers, and 0.

Intersecting lines: Two lines that meet exactly at one point.

Inverse operation: An operation that reverses another, as addition reverses subtraction, or vice versa.

Irrational number: A real number that cannot be expressed as the quotient of two integers.

Isosceles triangle: A triangle with two congruent or equal sides.

K

Kilo (k): A metric prefix indicating 1000 times the base unit.

Kilogram (kg): A unit of mass in the metric system. 1 kilogram = 1000 grams.

Kilometer (km): A unit of length in the metric system, equal to 1000 meters.

L

Least (lowest) common denominator: The smallest number divisible by each denominator in a set of denominators; the lowest common multiple of a set of denominators.

Least (lowest) common multiple: The smallest number divisible by each whole number in a given set of whole numbers.

Like fractions: Fractions with a common denominator.

Line: A never-ending straight path, such as <-----A----------B---->.

Line graph: A graph using line segments to show growth or change.

Line of symmetry: A line that separates a figure into two halves that match exactly when the figure is folded.

Line segment: Part of a line with two endpoints, such as G |————————| H.

Liter (L): The basic unit of liquid measure in the metric system.

M

Manipulable materials: Materials used for demonstration or exploration.

Mathematical problem: A problem that must be solved by mathematical reasoning.

Mathmatical sentence: An equation or inequality.

Mean (average): The sum of the numbers divided by the number of addends.

Median: The middle number in an ordered set of data. If there are two middle numbers, the median is the mean of those two numbers.

Meter (m): The basic unit of length in the metric system.

Metric system: A system of measurement using four basic units: meter for length, gram for mass, liter for capacity, and degrees Celsius for temperature.

Mile (mi.): A unit of length in the commonly used U.S. system (1 mile = 5280 feet, 1,760 yards).

Milliliter (ml.): The metric unit for 0.001 liter.

Millimeter (mm.): The metric unit for 0.001 meter.

Minuend: A number from which another number is subtracted. In the problem 8 - 6 = 2, the minuend is 8.

Minute (min.): A unit of time (1 minute = 60 seconds).

Mixed number: A number made up of both a whole number and a fraction (2-1/2, 3-1/4).

Multiple: The product of any integer and a whole number is a multiple of that number.

Multiplication-division pattern: One factor times another = product; product divided by one factor = the other factor (3 x 4 = 12; 4 x 3 = 12; 12 divided by 3 = 4; 12 divided 4 = 3).

Multiplicative identity: The number 1 is the multiplicative identity: 1 x n = n.

N

Negative number: A number that is less than zero.

Nonstandard unit: An arbitrary unit (handfuls, pencil lengths, etc.) used to illustrate the concept of measurement.

Nonterminating decimal: A decmal with an indeterminate number of decimal places, such as the decimal representation for 1/3 (0.33333....).

Norm-referenced test: A standardized test accompanied by statistical information that may be used to interpret particular scores.

Number family: A set of basic facts with the same sum.

Number line: A line with numbers marked at points on the line.

Number pattern : An arrangement of numbers to illustrate a mathematical concept.

Number period: The system of grouping places in a numeral to facilitate reading.

Number property: A fundamental characteristic of a number or number operation.

Numeration system: A set of symbols for numbers, such as base 10 or the Roman numbering system.

Numerator: In the faction a/b, a is the numerator.

O

Obtuse angle: An angle that measures from 90 to 180 degrees.

Odd number: A whole number that does not have 2 as a factor.

Opposite angles: In a quadrilateral figure, two angles diametrically opposed to each other.

Opposites: Two numbers whose sum is 0. +5 and - 5 are opposites because they add up to 0.

Ordered pair: A number pair, such as (3, 5), in which the lower number is first and the higher number second.

Order of operations: The sequence in which steps should be taken.

Ordinal numbers: A set of numbers that can answer the question 'which one?' (first, third, etc.).

Origin: On a grid, the point (0) where two number lines or axes intersect.

P

Parallel lines: Lines in the same plane that do not intersect.

Parallelogram: A quadrilateral with two pairs of parallel sides.

Pentagon: A five-sided polygon.

Percent (%): A word that indicates hundredths, or 'out of 100': 45 percent (45%) means 0.45 or 45/100.

Perimeter: The distance around a polygon.

Permutations: The possible arrangements of a set of objects or numbers. The permutations of set A, B, C are:

ABC BAC CAB
ACB BCA CBA

Perpendicular lines: Two lines that intersect to form right angles.

Pi: The number obtained by dividing the circumference of any circle by its diameter. A common approximation for pi is 3.1414....

Place value: The value of a digit based on its position in a numeral.

Polygon: Any plane figure made up of segments.

Polyhedron: A space figure with all flat surfaces. The outline of each surface is a polygon.

Positive integer: An integer greater than 0, such as +1, +2, +10, or + 25.

Prime factor: A factor that is a prime number; prime factors of 10 are 2 and 5.

Prime number: A whole number, greater than 1, that has only two factors: itself and 1; 17 is a prime number.

Prism: A polyhedron with two parallel faces, called bases, that are congruent.

Proper fraction: A fraction whose numerator is less than its denominator.

Probability: A number that tells how likely it is that a certain event will happen.

Proportion: a sentence stating that two ratios are equivalent: 1/3 = 4/12.

Pyramid: A solid figure with three or more triangular sides whose base is shaped like a polygon.

Pythgorean theorem: In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Q

Quadrilateral: A polygon with four sides.

Quotient: The answer obtained by dividing one number by another.

R

Radius: A line segment from the center of a circle, or the length of such a segment.

Range: The difference between the greatest and smallest number in a set of data.

Ratio: A pair of numbers used to express a rate or a comparison.

Rational number: Any number that can be expressed as either a terminating decimal or a repeating decimal

Ray: A line segment with one endpoint that goes on and on in one direction.

Real numbers: The set composed of rational and irrational numbers. These numbers can be seen as points on a line.

Reciprocals: Two numbers whose product is 1. 3/4 and 4/3 are reciprocals because $3/4 \times 4/3 = 1$.

Rectangle: A parallelogram with four right angles.

Repeating decimal: A decimal in which one or more digits keep repeating: 0.51818.

Rhombus: A parallelogram whose sides are equal or congruent.

Right angle: An angle that measures 90 degrees.

Right triangle: A triangle with one right angle.

S

Scale drawing: A representation of something too large to be shown actual size. The scale is the ratio of the scale measurements to actual measurements.

Scalene triangle: A triangle that has no congruent or equal sides.

Scope and sequence: In education, refers to the total amount (scope) of material to be covered at a given grade level and the order (sequence) in which the material is to be taught.

Segment: Part of a line, including the two endpoints.

Semicircle: An arc that is one half of a circle.

Sequence: A list of numbers in a certain pattern. In the following sequence, each number is four more than the one before it—6, 10, 14, 18, 22...

Set: A collection of elements or members.

Similar figure: Figures that have the same shape.

Simplest form: A fraction is in its simplest form when the greatest common factor (GCF) of its numerator and denominator is 1.

Solid: A three-dimensional figure and its interior.

Square: A parallelogram with all sides and all angles congruent.

Square number or square: A number that is the product of two equal factors. A perfect square is the square of whole number. For example, 36 is a perfect square since $36 = 6 \times 6$.

Square root: One of the two equal factors of a number. For example, 4 is the square root of 16 since $16 = 4 \times 4$.

Standard form of number: The simplest place-value form. The standard form for three hundred eighty-four is 384.

Standard units: Officially designated units of measure with standards established and kept by a government.

Standardized test: Test prepared and administered to large groups with records kept to establish norms.

Strand: Refers to the area of mathematics being taught (addition, multiplication, estimation, geometry, etc.).

Subtraction: A mathematical operation to determine the number of things left or to compare one group to another.

Subtraction property of equality: If the same number is subtracted from each side of an equation, the new equation has the same solution.

$$k + 3 = 12$$
$$k + 3 - 3 = 12 - 3$$
$$k = 9$$

Subtrahend: A number that is subtracted from another number. In the problem 8 - 2, the subtrahend is 2.

Sum: The answer to an addition problem. In the addition sentence $15 + 20 = 35$, the sum is 35.

Supplementary angles: Two angles are supplementary if the sum of their degree measures is 180.

Surface area: The sum of the areas of all the surfaces of a solid figure.

Symmetry: Correspondence in relative size, shape, and position with respect to a dividing point, line, or plane.

T

Terminating decimal: A decimal whose digits terminate, or end. For example, the decimal equivalents of 1/2 (0.5) and 1/8 (0.12) are terminating decimals.

Ton: A unit of weight in the commonly used U.S. system (1 ton = 2000 pounds).

Trapezoid: A quadrilateral with one pair of parallel sides.

Triangle: A polygon with three sides.

U

Union: The union of two sets is the set of elements in either set or in both sets.

Unit fraction: A fraction with a numerator of 1.

Unlike fractions: Fractions with unlike denominators.

V

Variable: In an expression or an equation, a letter that represents a number

Venn diagram: A diagram using one or more circles inside a large rectangle to reperesent a certain situation.

Vertex: (1) the common endpoint of two rays that form an angle. (2) The point of intersection of two sides of a polygon. (3) The point of intersection of the edges of a polyhedron.

Volume: A number indicating the amount of space occupied by a space figure.

W

Whole numbers: The common name for cardinal numbers: 0, 1, 2, 3, etc.

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APPENDIX C. MATERIALS RESOURCE LIST

Materials are listed under the instructional strands for which they are most likely to be useful.

SETS

- Array board
- Attribute blocks
- Counters
- Plastic toys

NUMBERS AND NUMERATION SYSTEMS

- Abacus
- Base-10 counting frame
- Chip Trading
- Drill cards, Flash cards
- Decimal place value cards
- Expanded notation cards
- Flannel board, cutouts
- Fraction chart
- Fraction finder
- Fraction kit
- Functional parts (squares & circles)
- Dominoes
- Hundred chart board
- Number ladders
- Number lines
- Number & picture dominoes
- Place value board
- Place value chart
- Sticks, straws with rubber bands
- Place value indicator

OPERATIONS AND PROPERTIES

- Addition cubes
- Array boards
- Basic facts chart
- Counters
- Cross number puzzles
- Cuisinaire rods
- Hundreds board
- Number frame, Number lines
- Pattern board
- Spinners

MEASUREMENT

- Centimeter grid paper
- Centimeter number line
- Clock faces
- Liquid measure set
- Measuring tape
- Metric system chart
- Sets of boxes of different volume
- Number line ruler
- Thermometers—Centigrade & Fahrenheit
- Spring scale

GEOMETRY

- Attribute blocks
- Blocks and trays
- Centimeter grid paper
- Centimeter number line
- Chalkboard drawing instruments
- Drawing templates
- Circles, cubes, pyramids
- Flexible & adjustable polygons
- Geometric models and construction kit
- Geoboards
- Geometric solids and surfaces
- Geometric blocks
- Graph chart stencil
- Parallel ruler
- Pattern blocks
- Perimeter and area boards
- Protractors
- Compasses

RELATIONSHIPS, STATISTICS, AND GRAPHS

- Chalkboard graphs
- Charts, stencils
- Dice
- Greater than, Less than charts
- Number line paper
- Pegboard grid system
- Rubber stamp for small graph chart

APPENDIX D. RECORDING STUDENT PROGRESS

Yearly Progress Charts: The lists of objectives that make up the section on Levels of Instruction (beginning on page 95) may also be used to keep permanent records of student achievement. Beside each listed objective is a hollow square, to be filled in as appropriate for individual students, as shown:

not taught partially learned learned

Level and Textbook Record Form: This form may be used to supply continuing useful information about the student's mathematics instruction—grade levels and dates, textbooks used, and teachers.

Cumulative Progress Charts: These forms are used to trace the progress of individual students from level to level. Information from Yearly Progress Charts may be summarized on these forms at the end of each year.

Ideally, these records will become part of the student's permanent school file. Schools using this curriculum guide are encouraged to make enough copies of these forms to keep accurate day-to-day records for each student.

KDES

Level and Textbook Record
MATHEMATICS

Student's Name_____ Birthdate_____

School Year	Department	Curric Level	Textbook Publisher	Text Level	Teacher

KDES

Cumulative Progress Chart
MATHEMATICS

Student's Name_____ Birthdate_____

KEY: ☐ not taught ◪ partially learned ■ learned

LEVELS	SETS NUMBERS NUMERATION		OPERATION and PROPERTIES		GEOMETRY	MEASUREMENT	RELATIONS STATISTICS GRAPHS	PROBLEM SOLVING
ONE	1.01 ☐	1.09 ☐	1.01 ☐	1.06 ☐	1.01 ☐	1.01 ☐	1.01 ☐	1.01 ☐
	1.02 ☐	1.10 ☐	1.02 ☐	1.07 ☐	1.02 ☐	1.03 ☐	1.02 ☐	
	1.03 ☐	1.11 ☐	1.03 ☐	1.08 ☐		1.05 ☐	1.03 ☐	
	1.04 ☐	1.12 ☐	1.04 ☐	1.08 ☐			1.04 ☐	
	1.05 ☐	1.13 ☐	1.05 ☐					
	1.06 ☐	1.14 ☐						
	1.07 ☐	1.15 ☐						
	1.08 ☐	1.16 ☐						
TWO	2.17 ☐	2.25 ☐	2.10 ☐	2.19 ☐	2.03 ☐	2.07 ☐	2.05 ☐	2.02 ☐
	2.18 ☐	2.26 ☐	2.11 ☐	2.20 ☐	2.04 ☐	2.08 ☐	2.06 ☐	2.03 ☐
	2.19 ☐	2.27 ☐	2.12 ☐	2.21 ☐		2.09 ☐	2.07 ☐	2.04 ☐
	2.20 ☐	2.28 ☐	2.13 ☐	2.22 ☐		2.10 ☐	2.08 ☐	2.05 ☐
	2.21 ☐	2.29 ☐	2.14 ☐	2.23 ☐		2.11 ☐	2.09 ☐	2.06 ☐
	2.22 ☐	2.30 ☐	2.15 ☐	2.24 ☐		2.12 ☐		
	2.23 ☐	2.31 ☐	2.16 ☐	2.25 ☐		2.13 ☐		
	2.24 ☐	2.32 ☐	2.17 ☐	2.26 ☐				
			2.18 ☐	2.27 ☐				

Student_____

Cumulative Progress Chart

Mathematics
(continued)

LEVELS	SETS NUMBERS NUMERATION	OPERATION and PROPERTIES	GEOMETRY	MEASUREMENT	RELATIONS STATISTICS GRAPHS	PROBLEM SOLVING
THREE	3.33 ☐ 3.38 ☐ 3.34 ☐ 3.39 ☐ 3.35 ☐ 3.40 ☐ 3.36 ☐ 3.41 ☐ 3.37 ☐	3.28 ☐ 3.36 ☐ 3.29 ☐ 3.37 ☐ 3.30 ☐ 3.38 ☐ 3.31 ☐ 3.39 ☐ 3.32 ☐ 3.40 ☐ 3.33 ☐ 3.41 ☐ 3.34 ☐ 3.42 ☐ 3.35 ☐	3.05 ☐ 3.06 ☐ 3.07 ☐ 3.08 ☐	3.14 ☐ 3.15 ☐ 3.16 ☐ 3.17 ☐ 3.18 ☐ 3.19 ☐ 3.20 ☐ 3.21 ☐	3.10 ☐ 3.11 ☐ 3.12 ☐ 3.13 ☐ 3.14 ☐ 3.15 ☐ 3.16 ☐	3.07 ☐ 3.08 ☐ 3.09 ☐
FOUR	4.42 ☐ 4.48 ☐ 4.43 ☐ 4.49 ☐ 4.44 ☐ 4.50 ☐ 4.45 ☐ 4.51 ☐ 4.46 ☐ 4.52 ☐ 4.47 ☐	4.43 ☐ 4.54 ☐ 4.44 ☐ 4.55 ☐ 4.45 ☐ 4.56 ☐ 4.46 ☐ 4.57 ☐ 4.47 ☐ 4.58 ☐ 4.48 ☐ 4.59 ☐ 4.49 ☐ 4.60 ☐ 4.50 ☐ 4.61 ☐ 4.51 ☐ 4.62 ☐ 4.52 ☐ 4.63 ☐ 4.53 ☐	4.09 ☐ 4.10 ☐ 4.11 ☐ 4.12 ☐ 4.13 ☐	4.22 ☐ 4.23 ☐ 4.24 ☐ 4.25 ☐ 4.26 ☐	4.17 ☐ 4.18 ☐	4.10 ☐ 4.11 ☐ 4.12 ☐

Student_____

Cumulative Progress Chart

Mathematics
(continued)

LEVELS	SETS NUMBERS NUMERATION	OPERATION and PROPERTIES	GEOMETRY	MEASUREMENT	RELATIONS STATISTICS GRAPHS	PROBLEM SOLVING
FIVE	5.53 ☐ 5.61 ☐ 5.54 ☐ 5.62 ☐ 5.55 ☐ 5.63 ☐ 5.56 ☐ 5.64 ☐ 5.57 ☐ 5.65 ☐ 5.58 ☐ 5.66 ☐ 5.59 ☐ 5.67 ☐ 5.60 ☐	5.64 ☐ 5.76 ☐ 5.65 ☐ 5.77 ☐ 5.66 ☐ 5.78 ☐ 5.67 ☐ 5.79 ☐ 5.68 ☐ 5.80 ☐ 5.69 ☐ 5.81 ☐ 5.70 ☐ 5.82 ☐ 5.71 ☐ 5.83 ☐ 5.72 ☐ 5.84 ☐ 5.73 ☐ 5.85 ☐ 5.74 ☐ 5.86 ☐ 5.75 ☐ 5.87 ☐	5.14 ☐ 5.15 ☐ 5.16 ☐ 5.18 ☐ 5.19 ☐ 5.20 ☐	5.27 ☐ 5.28 ☐ 5.29 ☐ 5.30 ☐	5.19 ☐ 5.20 ☐ 5.21 ☐ 5.22 ☐ 5.23 ☐ 5.24 ☐ 5.25 ☐	5.13 ☐ 5.14 ☐ 5.15 ☐ 5.16 ☐
SIX	6.69 ☐ 6.78 ☐ 6.70 ☐ 6.79 ☐ 6.71 ☐ 6.80 ☐ 6.72 ☐ 6.81 ☐ 6.73 ☐ 6.82 ☐ 6.74 ☐ 6.83 ☐ 6.75 ☐ 6.84 ☐ 6.76 ☐ 6.85 ☐ 6.77 ☐ 6.86 ☐	6.88 ☐ 6.105 ☐ 6.89 ☐ 6.106 ☐ 6.90 ☐ 6.107 ☐ 6.91 ☐ 6.108 ☐ 6.92 ☐ 6.109 ☐ 6.93 ☐ 6.110 ☐ 6.94 ☐ 6.111 ☐ 6.95 ☐ 6.112 ☐ 6.96 ☐ 6.113 ☐ 6.97 ☐ 6.114 ☐	6.21 ☐ 6.22 ☐ 6.23 ☐ 6.24 ☐ 6.25 ☐	6.31 ☐ 6.32 ☐ 6.33 ☐ 6.34 ☐	6.26 ☐ 6.27 ☐ 6.28 ☐ 6.29 ☐ 6.30 ☐ 6.31 ☐ 6.32 ☐ 6.33 ☐ 6.34 ☐ 6.35 ☐	6.17 ☐ 6.18 ☐ 6.19 ☐ 6.20 ☐ 6.21 ☐ 6.22 ☐ 6.23 ☐ 6.24 ☐ 6.25 ☐

Student_____

Cumulative Progress Chart

Mathematics
(continued)

LEVELS	SETS NUMBERS NUMERATION	OPERATION and PROPERTIES	GEOMETRY	MEASUREMENT	RELATIONS STATISTICS GRAPHS	PROBLEM SOLVING
SIX (continued)		6.98 ☐ 6.115 ☐ 6.99 ☐ 6.116 ☐ 6.100 ☐ 6.117 ☐ 6.101 ☐ 6.118 ☐ 6.102 ☐ 6.119 ☐ 6.103 ☐ 6.120 ☐ 6.104 ☐				
SEVEN	7.88 ☐ 7.95 ☐ 7.89 ☐ 7.96 ☐ 7.90 ☐ 7.97 ☐ 7.91 ☐ 7.98 ☐ 7.92 ☐ 7.99 ☐ 7.93 ☐ 7.100 ☐ 7.94 ☐	7.121 ☐ 7.139 ☐ 7.122 ☐ 7.140 ☐ 7.123 ☐ 7.141 ☐ 7.124 ☐ 7.142 ☐ 7.125 ☐ 7.143 ☐ 7.126 ☐ 7.144 ☐ 7.127 ☐ 7.145 ☐ 7.128 ☐ 7.146 ☐ 7.129 ☐ 7.147 ☐ 7.130 ☐ 7.148 ☐ 7.131 ☐ 7.149 ☐ 7.132 ☐ 7.150 ☐ 7.133 ☐ 7.151 ☐ 7.134 ☐ 7.152 ☐ 7.135 ☐ 7.153 ☐ 7.136 ☐ 7.154 ☐ 7.137 ☐ 7.155 ☐ 7.138 ☐	7.26 ☐ 7.27 ☐ 7.28 ☐ 7.29 ☐ 7.30 ☐ 7.31 ☐ 7.32 ☐ 7.33 ☐ 7.34 ☐ 7.35 ☐ 7.36 ☐ 7.37 ☐ 7.38 ☐ 7.39 ☐	7.35 ☐ 7.36 ☐ 7.37 ☐ 7.38 ☐ 7.39 ☐ 7.40 ☐ 7.41 ☐ 7.42 ☐	7.36 ☐ 7.37 ☐ 7.38 ☐ 7.39 ☐ 7.40 ☐ 7.41 ☐ 7.42 ☐ 7.43 ☐ 7.44 ☐ 7.45 ☐ 7.46 ☐ 7.47 ☐ 7.48 ☐ 7.49 ☐ 7.50 ☐	7.26 ☐ 7.27 ☐ 7.28 ☐ 7.29 ☐ 7.30 ☐ 7.31 ☐ 7.32 ☐ 7.33 ☐

Student_____

Cumulative Progress Chart

Mathematics
(continued)

LEVELS	SETS NUMBERS NUMERATION		OPERATION and PROPERTIES		GEOMETRY	MEASUREMENT	RELATIONS STATISTICS GRAPHS	PROBLEM SOLVING
	8.101 ☐	8.108 ☐	8.156 ☐	8.182 ☐	8.40 ☐	8.43 ☐	8.35 ☐	8.35 ☐
	8.102 ☐	8.109 ☐	8.157 ☐	8.183 ☐	8.41 ☐	8.44 ☐	8.36 ☐	8.36 ☐
	8.103 ☐	8.110 ☐	8.158 ☐	8.184 ☐	8.42 ☐	8.45 ☐	8.37 ☐	8.37 ☐
	8.104 ☐	8.111 ☐	8.159 ☐	8.185 ☐	8.43 ☐		8.38 ☐	8.38 ☐
	8.105 ☐	8.112 ☐	8.160 ☐	8.186 ☐	8.44 ☐		8.39 ☐	8.39 ☐
	8.106 ☐	8.113 ☐	8.161 ☐	8.187 ☐	8.45 ☐		8.40 ☐	8.40 ☐
	8.107 ☐	8.114 ☐	8.162 ☐	8.188 ☐	8.46 ☐		8.41 ☐	8.41 ☐
			8.163 ☐	8.189 ☐	8.47 ☐			
E			8.164 ☐	8.190 ☐	8.48 ☐			
I			8.165 ☐	8.191 ☐	8.49 ☐			
G			8.166 ☐	8.192 ☐	8.50 ☐			
H			8.167 ☐	8.193 ☐	8.51 ☐			
T			8.168 ☐	8.194 ☐	8.52 ☐			
			8.169 ☐	8.195 ☐	8.53 ☐			
			8.170 ☐	8.196 ☐	8.54 ☐			
			8.171 ☐	8.197 ☐	8.55 ☐			
			8.172 ☐	8.198 ☐	8.56 ☐			
			8.173 ☐	8.199 ☐	8.57 ☐			
			8.174 ☐	8.200 ☐	8.58 ☐			
			8.175 ☐	8.201 ☐	8.59 ☐			
			8.176 ☐	8.202 ☐	8.60 ☐			
			8.177 ☐	8.203 ☐	8.61 ☐			
			8.178 ☐	8.204 ☐	8.62 ☐			
			8.179 ☐	8.205 ☐	8.63 ☐			
			8.180 ☐	8.206 ☐	8.64 ☐			
			8.181 ☐	8.207 ☐				

Gallaudet University
Pre-College Programs

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